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THE MEDICAL TREATMENT OF GALL-STONES

J. H. KEAY, M.A., M.D.

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THE MEDICAL TREATMENT

OF

GALL-STONES

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GALL-STONES

BY

J. H. KEAY, M.A., M.D.

PHILADELPHIA

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THE MEDICAL TREATMENT OF GALL-STONES

ERRATA

Page 5. Kehr is here represented as saying that probably one in ten individuals in Germany have gall-stones, and as agreeing with Riedel that gall-stones are probably to be found in two millions of the inhabitants. On the basis of this statement it is carelessly assumed that the population of Germany is twenty millions. It is quite true that the population of Germany, apart from Prussia, may be roughly set down as twenty millions, but Kehr's reference is not to Germany in the old geographical sense, but to the German Empire, and his estimate is not based on the assumption that one in ten of the whole population, but that only one in ten of the adult population, have gall-stones. If we are to form a conjecture on the basis of post-mortem statistics, the number must considerably exceed two millions, and the estimate for this country given on page 5 is probably not far from correct.

Page 34. *For* "yphoid" *read* "typhoid."

THE MEDICAL TREATMENT OF GALL-STONES

INTRODUCTORY

NAUNYN'S treatise on gall-stones, translated for the New Sydenham Society, and published in 1896, is one of the ablest and most scientific works that has ever been written concerning any disease. Though his recent contributions show that he has somewhat altered his conclusions since this book was written, still it remains the classical work on the subject. Mayo Robson, Kehr of Halberstadt, and others who have had large experience in the surgical treatment of gall-stones, have also written voluminously on diseases of the gall-bladder and bile-ducts. Of the making of books, reporting of cases, and writing of articles on this subject there is no end. The reader is therefore reasonably entitled to ask what has induced me to write on a subject on which others have already so ably written. My reasons are : (1) A long and painful personal experience of this disease, and a careful and painstaking examination of many who have similarly suffered, have forced me to certain conclusions not in accordance with those of Mayo Robson, Kehr, and other writers. (2) So brilliant have been the achievements of our gall-stone surgeons, so much has been written on the surgical aspect of the subject, that it seems to

be forgotten that this is a disease specially amenable to medical treatment; and were medical and hygienic means adapted to the requirements of each individual resorted to early enough in the course of the disease, in very few cases indeed need the question ever arise as to whether the patient should submit to the brilliant, yet often dangerous and even fatal, remedies of the gall-stone surgeon.

A simple incident sometimes induces one to undertake work which seems easy enough, but which can only be accomplished by long and patient endeavour. It is no easy matter reading, sifting and analyzing all that has been written on gall-stones, and setting down the conclusions one has formed in simple and succinct form. The following simple incident has, however, made me cease to hesitate, and given me a firm conviction that it is my duty to set down in behalf of others what, had I known sooner myself, would have saved me much pain and needless anxiety:

A near relative of mine, who for many years had suffered from gall-stones, had come on a visit, and while we were going over past experiences I was called into my consulting-room to see a patient who was said to be very ill. This patient I saw for the first time, and as soon as she mentioned gall-stones I thought it would be interesting to compare the history of the three individuals who had suffered from the same disease, and who had casually met under the same roof. The history of these three individuals I shall give for the benefit of my readers and of those surgeons who are perpetually reproaching medical men for not sending their patients sooner for operation.

Let us take first the relative of mine referred to. Eleven years ago I was wired for in haste to go a long distance as she then appeared to be almost *in articulo mortis*. Well do I remember the sunk cheeks, the deep jaundice, the burning skin (temperature 105°), the greatly enlarged and tender

gall-bladder, and the emaciated form of one who, till the advent of this disease, had shown every sign of robust health. With her medical attendant I quite agreed that recovery was practically impossible. In a half-hearted way I suggested operation as a last resource, feeling at the same time that it was extremely doubtful if she could survive the shock. Operation was declined, and for years past she has had no attack of biliary colic, now weighs over 13 stone, and bears no trace of the disease beyond rather persistent and troublesome itching.

The next individual to whom I shall reier is myself. I had suffered tortures from frequently recurring attacks of biliary colic, became sleepless, irritable, and depressed, and utterly unfit for work. I asked advice from various medical men, and consulted, among others, an eminent specialist. He assured me that operation would be attended with very little risk, and told me on leaving him that though I might defer it for a time I was sure to come back to him. As the attacks still continued jaundice supervened, and my strength was becoming more reduced. I had finally decided on submitting to operation, when one morning I passed half a dozen gall-stones. The jaundice disappeared, and though several attacks occurred afterwards and I passed more biliary calculi, they gradually disappeared, and for nearly three years I have had no symptoms, and, I trust, am now permanently free from biliary colic. There was no operation.

The third case is that of the patient who has come to my surgery. She had suffered a good deal, but I cannot find that her life was ever seriously in danger. She was operated on in 1895 (cholecystotomy), when forty gall-stones were removed; and again in 1897 (cholecystectomy), when the gall-bladder and thirty gall-stones were removed. From neither operation has she experienced appreciable relief, and to-day

she looks haggard, is slightly jaúndiced, and complains of almost constant pain.

Let us consider the history of these three individuals who thus happened to meet under the same roof. The first was so worn out by pain and fever eleven years ago that it seemed impossible she could survive. She underwent no operation, and to-day is strong and well. The life of the second was never in imminent danger, but he was so worn out by pain and sleeplessness as to be quite unfit for work. He declined operation, and to-day and for nearly three years past has been practically free from all traces of this disease. The third underwent two operations, but to-day is suffering acutely and pitifully pleads for some measure of relief. The history of these three individuals proves nothing. It is a simple coincidence, and I would not have mentioned it, were it not in accord with my wider experience that nearly all who suffer from gall-stones get relief sooner or later without operation, and with what I learn from the records of surgeons themselves—viz., that operation by no means always procures permanent freedom from the symptoms of this disease.

Before entéring on a somewhat systematic discussion of the subject, I shall mention three considerations that, I think, should be well weighed before any medical man advises a patient to submit to operation:

1. Winiwarter, a German surgeon, has said that the diagnosis of gall-stones is sufficient indication for operation. This is exceptional. There are few medical men or surgeons who would ever dream of suggesting that every individual who has gall-stones in the bladder or bile-ducts ought to undergo operation to have them removed. Post-mortem records abundantly show that the presence of gall-stones is not inconsistent with long life, and they have been found in large numbers in the gall-bladders of those who have never

during life suffered any pain or discomfort that led even to a suspicion of their existence. In 1,150 post-mortems made at Strassburg, Schröder found gall-stones in the gall-bladder and bile-ducts of 141—12·26 per cent. In 742 post-mortems made at Manchester, Brockbank found gall-stones in 49—6·6 per cent. Did every individual in whose gall-bladder or bile-ducts are gall-stones suffer in consequence the agonies of biliary colic, peace on earth would be impossible. So sudden and severe are the attacks that seldom would there be a gathering in church, theatre or music-hall undisturbed by the groans of the sufferers. Happily, when the stones do not migrate nor set up inflammation, there is no need for interference, and from this follows the corollary that if by medical means the stones can be kept at rest and inflammation prevented surgical treatment is unnecessary.

2. Medical and hygienic remedies can claim a vastly larger proportion of cures than surgical. What proportion of those who have gall-stones ever actually suffer it is exceedingly difficult to estimate. Kehr reckons that in Germany one out of every ten individuals have gall-stones, and taking the population of Germany as 20,000,000 we thus find that of that number 2,000,000 have gall-stones. Of the 2,000,000 however, he reckons that only 1 in 20, or 100,000, ever suffer from biliary colic or other symptoms of the disease.

If we take the population of the British Isles as 40,000,000, and proceeding on post-mortem statistics regard gall-stones as half as prevalent here as in Germany, we shall probably be near the mark. Gall-stones being half as prevalent and the population twice as large, we may take it roughly that in this country also 2,000,000 have gall-stones, but of this number only 100,000 actually suffer. During the past ten years there have been probably nearly 2,000 operated on for

gall-stones. What of the 98,000 or thereabouts who have suffered and not undergone operation? Of the 2,000 who have undergone operation we know something from the statistics given us by Mayo Robson and others. The result has not always been satisfactory. Surgeons speak of a mortality now reduced to 1 per cent. in the simplest cases. Some of them seem to make light of this mortality. I cannot so regard it, and certainly myself felt, when proposing to undergo operation, that it was not to be so treated. Place one hundred men in a row. Tell them that a shot will be fired which must inevitably kill one, and I venture to say not one of the hundred will feel particularly comfortable till that shot is fired. Unfortunately, however, all cases are not simple; many of them are complicated, and among these surgeons themselves admit a mortality of from 5 to 30 per cent.

But what of the 98,000 who have not undergone operation? From the Registrar-General's statistics we find that in 1879, in England and Wales, 172 deaths were attributed to gall-stones, and that since that year there has been a gradual increase in mortality, culminating in 1899, when the number of deaths attributed to this disease was 488. Medical men in large practice state that though they have attended many patients for gall-stones they do not remember having ever certified a death as due to that cause. This we can readily understand when, even in 1899—the year of highest mortality on record according to the Registrar-General's statistics—only 1 in about 1,200 deaths was attributed to gall-stones. Many of the patients seen in ordinary practice have only slight and transient attacks. Medical men in Carlsbad, to which so many resort who suffer from the disease in a more aggravated form, say they very seldom have a fatal case and send very few to the surgeon. Take even Naunyn's statistics of the patients seen in Strassburg,

where most of the patients seem to have suffered from this disease in a very aggravated form: of 150 treated by Naunyn, 20 died. Of the 20 deaths, 11 were due to cancer, and these we shall exclude from our calculations, as in such cases surgeons as a rule do not care to operate, and all treatment, medical and surgical, is as yet practically hopeless. Excluding the 11 who died from cancer, there remain 139, of whom 9 died, a mortality of 6·5 per cent. Not one of these fatal cases was under fifty years of age: all were of long standing and evidently suffering from some serious and complicated form of the disease.

From the Registrar-General's and other statistics we may thus conclude that no great advantage seems to have accrued from operaton in lessening the mortality from gall-stones.

Operation I certainly believe to be the best treatment in a limited number of cases, but cannot shut my eyes to the fact that, if you take from the 98,000 who have not undergone operation 2,000 cases of a similar type to those on whom operation has been performed, you will probably find the mortality among those who have been left to the *vis medicatrix naturæ*, or been treated by medical or hygienic means, to be considerably less than among those who have undergone operation.

3. When in any individual case the question of operation comes to be discussed, the argument generally advanced in its favour is, that though the mortality be comparatively high, the relief given is more rapid than by any other means, and the cure more likely to be complete.

As regards relief being more quickly obtained by surgical than other means, it is true that many patients are able to leave the hospital in a few weeks, but I have not yet seen anyone who has undergone a severe operation restored to the average strength and energy within a few months, while

the effect on the constitution is generally felt for a lifetime. To this, however, many patients who for a long period have suffered would readily submit, provided they could be assured there would be an end to the frequently recurring attacks of agonizing pain.

Unfortunately, however, operation provides no absolute safeguard against future attacks. Than Kehr of Halberstadt no surgeon has had a larger experience, nor probably can anyone be regarded as his superior in diagnosis or technique. In his 'Anleitung zur Erlernung der Diagnostik der einzelnen Formen der Gallensteinkrankheit' we find the following sentence, which summarizes a great part of his work: 'I have up to April 1, 1899, performed 409 operations on 353 patients suspected of gall-stones, or in whom gall-stones were actually found to be present.' Here we find 56 operations more than the number of patients. Allowing for the fact that some may have been operated on oftener than twice, we thus find that, say, 50 in 353, or 1 in 7 had to undergo operation oftener than once. Some of these operations, we find from the list of cases appended, were due to the first operation not being complete, others to a return of the disease. The number of patients subjected to more than one operation may seem large, but when we consider the nature of the operation usually performed, the result seems very satisfactory, and the number is less than we would have anticipated. When the gall-bladder is merely opened (cholecystotomy) and its contents—gall-stones, mucus, or pus—removed, if the condition which led to the formation of the gall-stones persist, there seems to be no reason why they should not continue to form. It is a well-known fact that after operations of this kind stones are frequently passed. After the more severe operation of cholecystectomy, with a mortality in the hands of the best surgeons of 5 to 25 per cent., when

not only the contents but the gall-bladder itself is removed, it is true that stones can no longer form in the gall-bladder; but this gives no security against their formation in the bile-ducts. This is what happened in one of the cases to which I have already referred.

Every medical man must of course feel that a great responsibility is incurred when he is called upon to advise his patient to refuse or submit to operation. If the disease has considerably advanced, to decline operation may mean a long period of severe and oft-recurring pain, with the risk of perforation or serious septic mischief that will in all likelihood sooner or later prove fatal. On the other hand operation may mean death, or only a very temporary relief from the intolerable agony of this disease. It is now more than twenty years ago since Mr. George Brown, a general practitioner in London, operated for gall-stones, but it is only within the past dozen years that the operation has become familiar to surgeons and medical men. In the early days of its history the successful cases published by Lawson Tait and Mayo Robson aroused great expectations and made a deep impression on medical men as well as the general public. Though these expectations have not yet been realized, though operation has not yet been proved to be without danger nor an absolute safeguard against the recurrence of the symptoms of this disease, yet the belief in the efficacy and advisability of operation in many quarters is so strong that medical men have felt uncomfortable when they could not make up their mind to advise their patients to submit to operation. Considerations such as the above should, I think, however, weigh somewhat with the surgeon who rashly blames the medical man who clearly sees the serious issue involved in operation, and does not abandon all hope of relieving the patient or even accomplishing an absolute cure by other means.

Having thus introduced the subject, we shall now proceed to consider it more systematically. In doing so, I shall confine myself to a statement of those facts, a knowledge of which has been useful to me in practice, and so condense that these pages may be read and digested in four or five hours.

GREENWICH,
December, 1901.

CHAPTER I

THE FORMATION OF GALL-STONES

It would serve no practical purpose to enter into any detailed description of gall-stones, or to discuss their endless variety in form, size, colour, and consistence. Anyone who can find time to visit the Museum of the Royal College of Surgeons, London, or any other pathological museum, and examine the numerous specimens to be found in these museums, can with less pains learn more in an hour than by a long and careful perusal of text-books. Suffice it to say that they are found of almost every colour—white, gray, brown, or black; of any size, from a grain of sand to a walnut, or even larger; of any shape—round or smooth, sharp or angular, often facetted; and in any number, from solitary stones, which are usually large, to scores or hundreds, or even, as in one or two cases that have been described, to practically a thousand in a single gall-bladder. The kind most frequently met with is the size of a pea or smaller, grayish-white in colour, facetted when they have been lying in contact, for the most part readily breaking down or easily crushed between the thumb and finger.

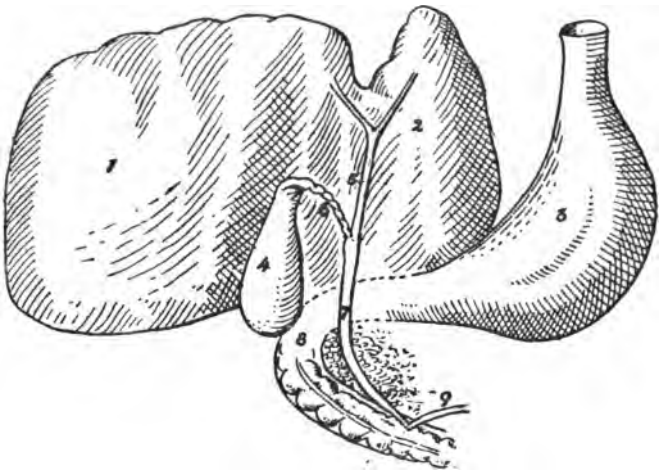
How comes it that gall-stones are formed? The explanation is by no means difficult. The difficulty rather is in understanding how it is that the bile, containing as it does much solid material, and having to pass to the intestine

through extremely narrow ducts, does not oftener leave solid particles or concretions behind. Were the bile a pure liquid like distilled water, and were it entirely unirritating and produced no exudation from the walls of bladder or ducts, there would, of course, be no deposit. Containing, however, as it does, a considerable amount of solid material, and having to pass from the liver to the intestine through extremely narrow ducts, it is easy to understand how the purely liquid material can find its way through, while the solid constituents remain behind.

Recall the fact that from a pint to a pint and a half of bile is formed and has to be excreted every twenty-four hours, and that this liquid has a high specific gravity and contains from a quarter to half an ounce of solid material, and we can then readily understand that, where there is any obstruction to its flow, the liquid material may pass the obstruction, while the other ingredients remain behind and form concretions or stones. Turn to the diagrammatic representation of the gall-bladder and bile-ducts: observe the length and extreme narrowness of the ducts through which the bile must pass from the liver into the intestines. Further, be it remembered that by no means all the bile which is excreted by the liver passes directly through these ducts into the intestines, but that a considerable portion of it, after passing through the hepatic ducts, passes backwards through the cystic duct into the gall-bladder, which acts as a reservoir. Observe, also, the inverted position of the gall-bladder, the fundus at a lower level than a considerable proportion of the ducts, and you will readily perceive how, if the bile be abnormal, or contain an excess of solid material, or there be any obstruction in the ducts, the liquid portion will pass through, while the other constituents remain behind and solidify.

When you take these anatomical facts into account, and

likewise the feeble expulsive power of the gall-bladder, especially in old age, the origin of gall-stones need puzzle no one. The difficulty rather is, as we have said, to understand how the bile, with its large amount of solid constituents, a considerable part of which lies for a time in the inverted gall-bladder, can pass through these small ducts withou



DIAGRAMMATIC REPRESENTATION OF GALL-BLADDER AND BILE-DUCTS.

1. Right lobe of liver.
2. Left Lobe of liver.
3. Stomach.
4. Gall-bladder, $3\frac{1}{2} \times 1\frac{1}{2}$ inches.
5. Hepatic duct, $2 \times \frac{1}{8}$ inches.
6. Cystic duct, $1\frac{1}{2} \times \frac{1}{12}$,,
7. Common duct, $3 \times \frac{1}{4}$,,
8. Duodenum.
9. Pancreatic duct.

leaving some of its solid constituents behind. And once let a small concretion be formed, we can readily understand, from a comparison with the lime-crusts formed on nests and other materials that have been placed in the calcareous wells near Matlock or elsewhere, how even soft concretions of inspissated bile or mucus take up the undissolved particles

of lime that are found in the bile, and gradually attain a considerable size and firm consistence. It would serve no purpose to discuss the precise method by which this is accomplished, nor the exact elements of which the nucleus is composed. Suffice it to say that, using the old terms, from this nucleus of inspissated bile or mucus, in six months, or possibly in less, a stone of average size is formed, and, judging from the fact that the stones found in any single gall-bladder are generally of the same kind, we may naturally conclude that, as a rule, they are not formed singly, but are simultaneously developed at some particular period of the life-history.

In order, however, to obtain a more precise knowledge of the materials of which gall-stones are composed, it will be necessary to consider briefly the different constituents of bile, and more especially those constituents that take part in the formation of gall-stones, it being at the same time clearly understood that gall-stones are not always stones in the ordinary acceptation of the term, but that even small concrements of material soft as putty can sometimes cause severe pain, and constitute a well-marked type of disease.

The main constituents of the bile are the bile-salts (glaucocholate and taurocholate of soda), bile pigments and colouring matters (bilirubin and biliverdin), fatty and soapy materials, cholesterin, and small quantities of lime, soda, and iron.

The materials with which we are chiefly concerned, and of which gall-stones are mostly composed, are (1) cholesterin; and (2) lime, more especially in its combination with bilirubin (bilirubinate of lime).

1. **Cholesterin.**—This substance is found in almost every part of the body, in the blood and bile, in considerable quantity in the brain and nerve tissues, in secretions from the mucous membranes as the windpipe, in large quantity

in the sputa of bronchitis, and the proportion is still larger in pus. Anyone possessed of a microscope can examine it by a low power, if at the trouble to collect a little of the material expectorated during a common cold. It can be seen as crystals, rhomboid in form with a corner chipped out, colourless when viewed singly, white when clustered together. It is these crystals, insoluble in water, but soluble in alcohol, ether, turpentine, normal bile, soap, etc., that, either by themselves or in combination with other substances, form practically all gall-stones.

Whence, then, comes this cholesterin which takes so large a part in the formation of biliary calculi? When cholesterin is secreted in normal quantity, it is held in solution by the bile-salts and fatty acids, and does not solidify. When, however, it is formed in excess, or there is a diminution of the salts and fatty acids of the bile that hold it in solution, it tends to solidify and form concretions. We shall not enter into the controversy, the discussion of which would fill many pages, as to whether any portion of cholesterin is secreted by the liver-cells, or whether it is entirely derived from the lining membrane of gall-bladder and bile-ducts. On the one hand, it has been said that, unlike most of the constituents of bile, it is not secreted by the liver, as the amount of cholesterin in bile is not increased by any kind of diet, nor even by feeding on cholesterin itself. Gamgee and others, while admitting that the great proportion of cholesterin, especially when formed in excess, is derived from the lining membrane of gall-bladder and bile-ducts, are still, however, of opinion that the amount found in the bile is partly derived from the cells of the liver.

Be this as it may—and the point is of no great practical importance—there is now a general consensus of opinion that the main source of cholesterin when formed in excess is the lining membrane of the gall-bladder and bile-ducts.

We have seen that cholesterin is found in small quantity in the material excreted from the bronchial tubes in health, that it is found in larger quantity in the sputa of bronchitis, and in still greater quantity in pus. In all likelihood the secretion from the mucous membrane of the gall-bladder and bile-ducts is similar to that from the bronchial tubes. In health it is found in small quantity in the bile, in larger quantity when there is catarrh or irritation of the bile-ducts, and in still larger quantity when the inflammation is severe. The manner in which it is excreted by the cells is interesting, and can be found described in the text-books of pathology. Enough meantime for our present purpose it is to say that it is a fact fully established that cholesterin is derived in great part, if not entirely, from the lining membrane of gall-bladder and bile-ducts, and when that lining membrane is irritated it is formed in excess, and that it is this excessive formation which is the chief factor in the formation of stones. It is thus evident that, if we are to escape the risk of the formation of gall-stones, all irritation of the bladder and ducts must be avoided, or a larger quantity of bile-salts and soapy material be obtained from the bile to hold the cholesterin in solution. The causes that lead to irritation of the lining membrane of gall-bladder and bile-ducts we shall presently describe.

2. **Lime.**—Lime, as well as cholesterin, is one of the normal constituents of bile. It is doubtful if it is secreted in any quantity, or at all, by the liver-cells. Most probably it is entirely the product of the disintegration of the cells lining the hepatic ducts. When there is any catarrh of these ducts inside or outside the liver, the quantity is increased. Though a few calculi have been found consisting entirely of carbonate of lime, in practically all the lime is found in combination with cholesterin, bilirubin or mucus.

Though lime and bilirubin are both found together in the bile, it is only when the bile is abnormal that they enter into combination and form an insoluble compound. In experiments made outside the body, it is found that when lime-water is added even to concentrated bile no combination is formed. When lime-water is added in large quantity a precipitate is formed, but this again is re-dissolved by the addition of bile-salts. Experiment has further shown that when albumen or white of egg and various bacteria are added to the bile and lime-water, an insoluble precipitate of bilirubinate of lime is formed, and it is this latter experiment which probably explains how in certain circumstances bilirubinate of lime calculi are formed in the gall-bladder and bile-ducts. When cholesterin or any albuminous substance or bacteria are found in the bile-ducts, the result is that the bilirubin and lime, which otherwise exist in a fluid state in the bile, enter into combination and form the bilirubinate of lime stones. And once let even a few small particles of lime aggregate together, it is probable that the mechanical irritation of the lining membranes thereby produced readily leads to a further excretion of lime and cholesterin, and in this way from even small particles stones of considerable size may be formed.

From what has been said, it is evident that not only cholesterin, but bilirubinate of lime and all the materials that go to the formation of stones have their origin in something that produces irritation of the lining membrane of gall-bladder and bile-ducts.

We shall now proceed to inquire what are the causes that produce irritation of the lining membrane of bladder and ducts. The main causes, doubtless, are the entrance of bacteria and certain changes which develop in the bile itself. The irritating properties of bile are developed during stagnation, or irritation may be produced by sub-

stances conveyed from the intestine to the liver, and excreted from the liver along with the bile. Each of these causes we shall in turn briefly consider.

(*a*) The amount of cholesterin and lime is increased when irritating properties are developed in the bile by *stagnation.*

From normal bile there is no deposit. Its various constituents remain in solution. When, however, there is any obstruction to its flow, the bile becomes abnormal. This has been repeatedly proved by experiment. When the common duct is ligatured, inflammation rapidly supervenes in the gall-bladder, there is an abundant excretion of cholesterin, and along with these changes are found numerous bacteria. This inflammation and the presence of bacteria can only be explained by certain changes that take place in the bile itself. Clinically the result of stagnation is abundantly observed in aged people and women, and in those whose bile-ducts are compressed by tumours and other causes. In old age the expulsive power of the gall-bladder is weak, the bile becomes stagnant, and hence, as we shall see, gall-stones are vastly more prevalent in aged people than in youth or middle age. Pregnancy and corset-wearing produce obstruction in women; hence the much greater prevalence of gall-stones among women than among men.

All-important as is the stagnation of bile and obstruction of the ducts in producing calculi, we need not dwell on it. It has been universally recognised, and from the earliest writers down to those of the present day there is no one who has not insisted on it. To its importance we shall have repeated occasion to refer.

(*b*) Another by no means uncommon cause of gall-stones is the irritating properties of bile derived from the abnormal products of digestion. This, also, I regard as one of the causes of the formation of gall-stones, and we shall devote

a little more space to its consideration for two reasons: (1) The abnormal or irritating properties of the bile, apart from stagnation, as a cause of gall-stones has been ignored, or entirely denied, by almost every writer on the subject; (2) if gall-stones are in a considerable proportion of cases not due to stagnation, a condition often inevitable, then there is good reason for abandoning that spirit of hopelessness and uncertainty which has hitherto so much characterized our treatment of the disease.

There is no writer on gall-stones who does not perpetually remind us that the cause is stagnation of the bile and obstruction of the ducts. This stagnation is, as we have said, attributed to the feeble expulsive power of the gall-bladder in old age, and to compression of the ducts by pregnancy, tumours and sedentary occupations. Did I not believe that in many instances gall-stones are due to an entirely different cause I would have thought it a waste of time to pen a single line on the subject. The causes named by writers on gall-stones are practically inevitable. Old age is inevitable. Pregnancy, too, if the race is to survive, is inevitable. In our present civilization sedentary habits are to many a necessity. Of the origin of malignant growths we as yet know little, and their development we can do little or nothing to prevent.

Diseases due to such causes as these are the most hopeless in the whole realm of surgery or medicine. The medical man may ply his patient with drugs, the surgeon may empty his bladder of gall-stones. The relief given can only be temporary, and if the cause still remain, there is no reason to expect anything but an early recurrence.

It must have fallen to the lot of most medical men to be called at some time or other to a young or middle-aged man who had not led a sedentary life, and in whom there was no suspicion of tumour, and yet it has been found that he

was suffering from gall-stones. The question then must naturally arise, How comes it that this patient suffers from gall-stones? In his case there is not one of those causes present which have been all but universally regarded as the only causes that produce them. The muscular tissue of the gall-bladder is strong enough to expel the bile; there is neither tumour nor anything else to cause any compression of the ducts. How comes it, then, that he suffers from this disease? Some other explanation is evidently necessary.

Hunter, in his contribution to 'Diseases of the Liver' published in Allbutt's 'Practice of Medicine,' refers to some interesting experiments made by Stadelmann on the action of certain drugs, toluylendiamin, phosphorus and arseniuretted hydrogen. When toluylendiamin and other irritant poisons are administered there is at first an increased flow of bile, which is gradually replaced by a fluid which is diminished in quantity, loses all the characters of bile, and assumes that of an extremely viscid and almost colourless mucus. This viscidity is due to the large amount of débris from the mucous glands of the larger bile-ducts and gall-bladder, and from the epithelium of the smaller bile passages; in other words, it is the result of the action of certain poisonous irritants on the lining membrane of gall-bladder and bile-ducts. The passage of these irritant poisons produces also an intense congestion of the walls of the stomach and duodenum. That this inflammation does not proceed, however, by extension from the duodenum to the bile-ducts seems evident from the fact that exactly the same results are recorded when the common duct has been ligatured. Here, then, we have certain poisons irritating the lining membrane of gall-bladder and bile-ducts, producing a large excretion of cholesterin, lime, and the other materials of which gall-stones are composed.

In these experiments we find a close analogy to what is daily observed in the treatment of diseases associated with the liver. They simply confirm the conclusions at which I dare say most medical men have arrived, and even the laity who never heard of Stadelmann, viz., that the so-called disorders of the liver are for the most part due to improper or badly digested food. Long before I had an attack of biliary colic I suffered from occasional pains in the back, which were different from what is experienced in rheumatism or any other disease. I observed also a more or less constant yellowness of the conjunctivæ which I could not account for. This is quite in accordance with the statements I have had from others whom I had questioned as to their condition during the months preceding their first attack of biliary colic. They had suffered from headache, obscure pains in the back, had foul tongue, were irritable and depressed—had, in a word, all those symptoms which are generally termed 'biliousness.' The analogy between the poisons mentioned by Stadelmann and the irritant products of digestion is too evident to be by any possibility misleading. The action of toluylendiamin is severe. Other irritants, though less severe, we would naturally expect to produce similar results. It is admitted on all hands that there are abnormal products of digestion which are irritating, and when these pass into the blood and are excreted by the liver, we may naturally expect similar results to those which are produced by the still stronger irritants referred to. The analysis of bile in diseased conditions is by no means yet complete, and though we may not be able to say precisely what these irritating materials are, there is no reason to question their existence. If, then, the products of indigestion lead to a deteriorated quality of bile, and to the consequent excretion of cholesterin, lime, and other materials that constitute gall-stones, a new light is thrown

on the treatment of the disease, and in that treatment we need not be deterred even by the emphatic statement of Naunyn, 'There is no indication that the influence of food or metabolism come into play as causes of gall-stone formation.'

(*c*) A third cause for the formation of gall-stones is, doubtless, the entrance of bacteria. It is now the custom to regard all diseases as having a microbic origin, and if the microbe has not been discovered, it is confidently anticipated that some day it will be. There is no doubt that many diseases are due to microbes, but at the same time a field is necessary on which they can be cultivated. So long as the bile is normal, and the lining membrane of gall-bladder and bile-ducts is healthy, the entrance of any but moderately virulent micro-organisms is not likely to give rise to gall-stones. Bile is not now regarded as absolutely sterile, yet the few bacteria found in healthy bile produce no mischief. Ehrett and Stolz have found that, even after an injection of a culture of streptococci into the gall-bladder, the bile-ducts clear themselves very rapidly of the microbes thus introduced, and after eight days the bile is as aseptic as it is in the ordinary state. This, however, would not be the case if the bile were stagnant, or the lining membrane of the gall-bladder or bile-ducts diseased. It was long since observed that, when the bile-ducts were ligatured, the *Bacillus coli* and other bacilli were found in abundance in the gall-bladder, and inflammation rapidly supervened. Gall-stones by no means uncommonly also follow typhoid fever. It is doubtful, however, if the typhoid bacillus ever produces typhoid fever when the intestines are healthy, and still more doubtful if the typhoid organism can ever produce serious mischief in the gall-bladder and bile-ducts so long as there is a free flow of healthy bile. So favourite a habitat of the typhoid organism, however, is the gall-bladder that, when a

bacteriologist wants a culture, it is to the gall-bladder he frequently resorts.

Although micro-organisms have been found in at least 30 per cent. of calculi, and their presence is known to hasten the combination of bilirubin and lime, which is known as the bilirubinate of lime calculi, it was not till recently that anyone succeeded in manufacturing gall-stones in the gall-bladders of living animals. Mignot found that, when foreign bodies were introduced into the gall-bladder, they could stay there for an indefinite time, provided they were aseptic, without causing inflammation, or precipitating the solids from the bile. When foreign bodies impregnated with virulent micro-organisms were introduced, the result was violent inflammation and pus, but no gall-stones. When, however, attenuated cultures were introduced, gall-stones were occasionally found, and when to these attenuated cultures a foreign body was added, within five or six months gall-stones were formed with the greatest certainty.

There is a further observation which, perhaps, has not been so directly substantiated, but for which there is a considerable amount of evidence, namely, that the *Bacillus coli*, when coming from a healthy intestine, may be harmless or even beneficial, but that when it comes from a diseased intestine, or badly digested food, it can be productive of serious mischief in the gall-bladder and elsewhere.

From these observations it is evident that, when there is a free flow of healthy bile, no harm accrues from the presence or entrance of the ordinary micro-organisms. When, however, the bile is deteriorated, or the lining membrane of the bladder or ducts diseased, there can be little doubt that the streptococcus, the *Bacillus coli* from an unhealthy intestine, typhoid, and other organisms, can take an active part in the formation of gall-stones. We need not pursue the question further. A free flow of healthy bile, we repeat, is the main

consideration; the influence of microbes is secondary. We can do something to regulate the quality of bile. So far as internal organisms are concerned, we can do little to control or arrest their development apart from restoring fluids and tissues to a healthy condition so as to constitute a field unsuited for their growth.

The Indirect Causation of Gall-stones.

Having discussed the causes that lead directly to the production of gall-stones, we shall now proceed to consider what have been termed the predisposing causes, or those conditions of body or environment with which the disease is intimately associated.

1. **Heredity.**—That there is a hereditary tendency to gall-stones we may regard as probable, but, like many things else in the field of medicine, as 'not proven.' There are some who are of opinion that cholelithiasis is closely connected with certain constitutional diseases—*e.g.*, gout, atheroma, diabetes. Bouchard found in 165 cases that there was a parental history of rheumatism in 19, diabetes in 20, gout in 25, cancer in 10; while in 36 cases, or the rather large proportion of 1 in $4\frac{1}{2}$, one or both of the parents had suffered from the disease itself. In over 100 cases in which Kehr operated the family history is given, and among these one finds that near relatives had often similarly suffered. We are thus not without some evidence that there is a hereditary tendency in this disease; but where a disease is not directly transmissible, it is doubtful if it be of much advantage to dwell too much on one's liability to it. If every ache or pain in the region of the liver were to suggest gall-stones because some near relative had suffered from them, the dread of the disease would probably do more harm than any care, induced by a belief in its

hereditary tendency, would be likely to be productive of good.

2. **Age.**—In several Continental hospitals gall-stones have been found in 1 out of every 4 aged persons. Under 20 years of age they are seldom found, though there is no period of life absolutely exempt. In very rare cases they have been found in children newly born or a few months old. Schröder, whose statistics have been frequently quoted, gives a percentage in 1,150 cases examined of 2·4 in those under 20 years of age, 3·2 from 21 to 30, 11·5 from 31 to 40, 11·1 from 41 to 50, 9·9 from 51 to 60, and 25·2 from 61 years and upwards. Schröder's percentages correspond pretty closely with others that might be given, and from these it is evident that, while there is a gradual increase in percentage from the earliest years up to 60, after 60 the increase is much more marked. As it is probable that gall-stones are formed at particular crises in life, and do not gradually accumulate up to old age, it seems evident that there must be some cause more strongly operative in the later period of life. The increased excretion of cholesterin in old age, and the feebler expulsive power of the gall-bladder, have been generally regarded as explaining this high percentage. In old age the muscular fibre of the gall-bladder gives place to non-contractile fibrous tissue. The bile thus becomes stagnant, and the consequent increase of cholesterin readily explains the formation of gall-stones.

3. **Sex.**—That gall-stones are four or five times more common in women than in men is in accordance with what has been stated by all observers. Nor are the causes difficult to find; they are universally referred to pregnancy and diseases of the uterus, corset-wearing, and to some extent to sedentary habits.

(*a*) *Pregnancy.*—Schröder found that 90 per cent. of women who had gall-stones had borne children, a per-

centage somewhat greater than that given by other observers. When we consider that gall-stones is largely a disease of later life, and that a large percentage of women over fifty have borne children, our surprise at Schröder's at first sight astonishing statement is somewhat lessened. Notwithstanding this partial explanation, it must be admitted that pregnancy or a prolapsed uterus is an important factor in producing this disease. During pregnancy the free movement of the diaphragm is prevented, and it has been clearly proved that the movements of the diaphragm have a considerable influence in emptying the liver of bile. In the intervals of pregnancy we have the pendulous abdomen, and not infrequently the floating liver or kidneys, which lead to traction and sometimes kinking of the bile-ducts, and prevent the free flow of bile.

(*b*) *Corset-wearing.* — The close association between corset-wearing and gall-stones is also made strikingly evident by Schröder, who found gall-stones in 59·5 per cent. of corset-livers. The corset-liver is easily distinguished by the groove, often a deep one, in the right lobe. This depression of part of the liver unfavourably alters the position of the gall-bladder, and stretches the cystic duct so that the gall-bladder is not readily emptied.

4. **Occupation.** — While the fashionable physicians of Carlsbad state that this is a disease which especially affects the rich, the medical attendants of workhouses as confidently state that this is a disease which specially affects the poor. A sedentary life, bad digestion and brain fag are the elements in occupation that we might expect to influence this disease. Neither the indolent lady of wealth nor the hard-working shoemaker in the back-street have that amount or kind of exercise that tends to the free flow of bile. Bad digestion is common enough in all classes, and worry is quite as much a characteristic of the rich as of the poor.

In a word, there is nothing either in the statistics given or the environment of the individual, that would lead us to conclude that gall-stones are specially prevalent in any particular rank or occupation.

5. **Locality.** — In India, and probably most tropical countries the disease is extremely rare. In Europe it varies in frequency, being rather uncommon in Italy and Denmark, frequent in Germany and Austria, while England holds a medium position.

Though there are no accurate statistics to be obtained, there is certainly more than a mere general impression that this disease prevails to a much greater extent in some districts than in others. In London, though the death-rate from this cause does not markedly differ from that in other parts of the kingdom, I do not find it so common as in the north-east of Lancashire where I formerly lived. In Lancashire I certainly saw a large number of cases, and one of my medical neighbours informed me that he could readily take me to fifty in his immediate neighbourhood who had within a short time past suffered from biliary colic. The diet of the factory workers in north-east Lancashire consists of pastry two or three times daily, and from a pint to two or three quarts of tea. The foul tongue, the yellow conjunctivæ, the pain after food, send patients in crowds to the doctors' surgeries, while a glance at a medical man's prescription book shows that he is treating 60 per cent. to 80 per cent. of his patients for this condition. The London workman drinks beer possibly to a still more unreasonable extent than the Lancashire operative drinks tea, but his diet is plainer. His ancestors also drank beer, and gout or some closely allied disease prevails. In the long-run, through excessive beer-drinking the liver cells, heart and kidneys doubtless suffer, but I do not find that the London workman is subject to indigestion to nearly the same extent as

the Lancashire operative. To the significance of this we shall more particularly refer in discussing the influence of diet and digestion.

6. **Diet and Digestion.** — When discussing the direct causes of gall-stones, we drew special attention to one cause—namely, the abnormal and irritating quality of bile derived from badly-digested food. The food may be badly cooked, it may be taken irregularly or in too large quantity, it may not be properly masticated, it may not be suited to the individual requirements—anything, in fact, which leads to what is generally termed indigestion, we strongly hold to be a potent factor in producing gall-stones. This badly-digested food is conveyed to the liver, and part of it being excreted in the form of bile, any irritating properties it possesses set up inflammation of the bile-ducts, produce an increased supply of cholesterin, favour combination between bilirubin and calcium, cholesterin and bilirubinate of lime forming, as we have seen, the great proportion of all gall-stones.

Having stated this definitely, and with full conviction, at the same time we can find no reason to believe that there is any particular kind of diet that leads to the formation of gall-stones. With the exception of Mayo Robson and Brockbank, practically everyone has arrived at the same conclusion. Mayo Robson and Brockbank regard an abundant supply of nitrogenous food as a preventive of gall-stones. Some of their premises we readily admit, but we do not find, in anything they have said, sufficient to justify their conclusions. That the salts of bile, glaucocholate and taurocholate of soda, are largely the product of nitrogenous foods we admit, and that these bile-salts act as solvents of cholesterin may also probably be admitted. There is thus a good theoretical basis for the conclusion that those who subsist largely on beef-steaks or nitrogenous

food are not likely to suffer from gall-stones. Mayo Robson and Brockbank's reasoning from what actually occurs does not seem, however, quite so satisfactory. When Mayo Robson affirms that gouty people are more liable to gall-stones because they do not eat nitrogenous food, there are two reasons against accepting this conclusion: First, it has been by no means proved that gall-stones are a special property of gouty people; secondly, though it might in certain circumstances be expedient for those who suffer from gout to limit their consumption of meat, as a matter of fact we do not find that they do. Still more unsatisfactory is his reasoning from the greater prevalence of gall-stones in some parts of the world. It is quite true that gall-stones are twice as prevalent in Germany as in this country, and it is also probable that the Germans eat less nitrogenous food than we do. But if gall-stones are the result of living on non-nitrogenous food, what shall we say of India and other tropical countries, where the inhabitants subsist on a diet that is practically non-nitrogenous, and yet scarcely ever suffer from gall-stones? Brockbank's method of disposing of this rather awkward fact is ingenious, but while highly appreciating his painstaking investigations and much of what he has written about gall-stones, I am at the same time compelled to say that this is not the only conclusion at which he has arrived with which I cannot possibly agree. He states that though the Indians subsist almost entirely on rice, which is practically a non-nitrogenous diet, they nevertheless by taking large quantities of it manage to consume a considerable amount of nitrogen. This explanation will scarcely, I think, commend itself to any authority on dietetics. The amount of nitrogen in rice is certainly small, and if the Indian who lives on rice consumes as much nitrogen as the Englishman who lives on beef-steak, his consumption of rice must be enormous. In a word, there is

no sufficient reason to regard any particular kind of diet apart from its digestion as a cause of gall-stones.

There is a wide-spread impression that gall-stones are often due to drinking hard water, and this has been regarded as accounting for the greater prevalence of the disease in some districts than in others. Apart from the fact that the amount of lime taken in this way is not large in proportion to the amount contained in the ordinary articles of food, there are, it seems to me, four sufficient reasons to prove that this impression is not founded on any solid basis of fact. Firstly: It has not yet been shown by any reliable statistics that gall-stones are more frequent where a considerable quantity of lime is found in the water. Thinking it probable, however, that there must be some reason for this widespread impression, I have made inquiry as to certain districts, but have found nothing to justify the popular conclusion. Secondly: Jankau found many years ago, in experimenting on dogs, that the addition of large quantities of lime to the food produced no increase of lime in the bile. Other observers have possibly arrived at the same conclusion. At all events Jankau's results have not yet been called in question. Thirdly: We have already observed that bilirubin does not form an insoluble compound with lime in normal conditions, and that the bilirubinate of lime stones are only formed when the walls of the bile-ducts are unhealthy, and there is an excess of cholesterin. Fourthly: The mineral waters of Contrexeville and Carlsbad, which are regarded—and I think with good reason—as most valuable in the treatment of the disease, themselves contain a large amount of lime.

With good reason, then, I think, we may set aside the popular idea that gall-stones are due to drinking water containing more than the average amount of lime. Nor can I find any sufficient reason for accepting Lauder

Brunton's statement that it is those who drink too little water or other fluid that are afflicted with gall-stones. Even a casual remark made by a member of our profession so highly and deservedly esteemed as Lauder Brunton cannot be lightly set aside. Immediately after reading it I proceeded on a voyage of inquiry. I had no difficulty in meeting a considerable number who had suffered from biliary colic, but must confess that had I been inclined to form any conclusion based on the drinking of water, it would have been that gall-stones are more frequently found in those who drink too much water than in those who drink too little. It has been generally supposed, and we are not without evidence to show, that the specific gravity of the bile is lessened after the ingestion of a considerable quantity of fluid. When, however, we take into account the mechanism of the biliary circulation, it is not quite easy to understand how this should be. Be this as it may, it is evident that, while those who drink water judiciously—that is, a short time before meals, when the previous meal has been nearly digested—may benefit a little, those who drink too freely with meals so hinder and impair digestion that the impaired digestion is likely enough to give rise to those irritating qualities of bile that are themselves one of the causes of calculi. For my own part I can only say that for years before I had any attacks of biliary colic, I had been in the habit of drinking a tumblerful of water night and morning, and moderately during the day. A sparing use of water I could not, then, certainly in my case, regard as the cause of gall-stones.

While it cannot be said that there is any one particular kind of food or liquid that exercises a material influence on the formation of gall-stones, there is every reason to believe that a great deal depends on the time at which food is taken. The flow of bile into the intestine is most abundant

three to five hours after meals, and when meals are taken at regular intervals during the day the bile for the most part or entirely passes directly into the duodenum. When, however, the stomach is empty, and gastric and duodenal digestion at a standstill, the bile, instead of passing freely into the intestine, passes up the cystic duct into the gall-bladder which acts as its reservoir. This is what happens during the night, and when there is a long interval between meals. We have then a storage and stagnation of bile in the gall-bladder. Kehr has given considerable attention to this subject, and carefully noted the dependence of the flow of bile on food. In patients whose gall-bladders had been opened and a fistula established, he found that very little bile escaped externally during the day, the gall-bladder being nearly empty, but that during the night, or when there were long intervals between meals, the flow of bile from the gall-bladder was profuse. While quite recognising the fact that gall-stones are found more frequently in women than in men, and attributing this, as others have done, to the influence of pregnancy and corsets, he is of opinion that this prevalence may be also due in some measure to the fact that while, in Germany at least, women retire to bed early, and there is a long interval between their last meal during the day and breakfast, men sit up late and eat a hearty supper. Be this as it may, there is every reason to believe that too sparing meals consumed at too long intervals, are a not uncommon cause of gall-stones.

7. **Worry.**—I certainly regard this as so frequent a cause that it deserves to be classed with old age, pregnancy, and other causes that have already been named. Dr. Coe, writing in 1757 on 'Biliary Concretions,' says: 'Angry passions and long-continued grief have a wonderful effect on bile.' Thousands of years before some observant Greek gave to melancholy or depressed spirits through causes real or

imaginary the name 'hypochondria.' In these degenerate days, when the classics are sometimes forgotten, it may be necessary to remind some reader that 'melancholy' is derived from *melan chole*, black bile; and that 'hypochondria' is derived from *hypo*, under, and *chondros*, a cartilage.

From under the ribs or cartilages, not from the brain or heart, comes that train of symptoms which are termed 'hypochondria,' or 'melancholy.' The influence of fright or long-continued grief or worry on the liver and the flow of bile is well known. Cases have been mentioned when from fright or news of sudden calamity persons have become suddenly jaundiced. These cases are not numerous, and perhaps require to be verified. But medical men and others have numerous opportunities of observing that, after sitting by a critical case during an anxious and sleepless night, next morning the conjunctivæ are yellow, and the complexion dingy. I am not concerned to know whether in all such cases bile has been found in the urine, because it is not necessarily present in every case of obstruction to the escape of the bile. The presence of urobilin in the blood, denoting probably some inadequacy of the liver-cells or slight catarrh of the ducts, is sufficient to colour the conjunctivæ, but does not satisfy the ordinary tests for bile in the urine. Nor do I regard it as a question of vital importance whether jaundice from sudden fright is due to a paresis of the liver-cells, or to obstruction to the flow of bile through catarrh of the bile-ducts. The discussion of such vexed questions as these would occupy more space than can here be assigned to it. Enough it is to say that the association between low spirits and stagnation of bile is too intimate to be questioned. Worry is a characteristic of our present-day civilization. But when we inquire into the life-history of those who have suffered from

gall-stones, we find that more than the average number have been subject to excessive worry, and tell us of long periods of fretful days and sleepless nights. Stagnation of bile produces depression of spirits, and depression of spirits produces stagnation of bile. Once get entangled in the vicious circle, it is not easy to escape from it, and too often after the first attack of biliary colic the patient becomes depressed, and the bile is still further deteriorated, more cholesterin is formed, and what may have been only a little inspissated bile or mucus is transformed into biliary calculi.

The much greater prevalence of gall-stones in the insane is a fact which has often excited attention. It is only recently, however, that Dr. Edwards, Medical Superintendent of Camberwell House Asylum, who for some years has given special attention to this subject, informed me that in the course of 243 post-mortems, gall-stones were not found in the bladder or ducts of a single maniacal patient, but that in those suffering from melancholia they were practically always found, and that in the few cases in which they were not found there was lessened fluidity of bile, increase of pigment, and other inflammatory products. This he attributed to the melancholic sitting so much in a stooping posture. Doubtless, their prevalence may be partly explained by the attitude of body, but I cannot help thinking that it is also due in some measure to the depression of spirits.

8. **Other Diseases.**—It has already been mentioned that gall-stones frequently follow yphoid fever, and that the typhoid bacillus is found in a large proportion of cases in the gall-bladder. This is probably also true of influenza—at all events it has been found that influenza has frequently preceded an attack of biliary colic.

CHAPTER II

THE MIGRATION OF GALL-STONES

In order to obtain a rational basis for the medical treatment of gall-stones, it has been found necessary to dwell at some length on the conditions of health and environment that give rise to their formation. We have now to insist on it, and it is quite time that it were universally understood, that the presence of gall-stones do not themselves, however, constitute a serious disease. It has already been said that post-mortem records abundantly prove that the great majority of those who had stones in their gall-bladders never during life suffered any pain or inconvenience that led even to a suspicion of their existence. Kehr's statement that not more than one in twenty of those who have stones in their gall-bladder ever actually suffer is in accordance with what has been stated by other observers. In practically all cases, however, as soon as the stone begins to migrate—in other words to pass from the gall-bladder into the bile-ducts—the patient experiences the pain of biliary colic and other symptoms which draw his attention to the disease. From this it is evident that, as biliary calculi give no trouble when they remain at rest, and their mere presence can scarce be regarded as constituting a disease, the main purpose of therapeutics is to keep them at rest—in other words, to prevent their migration and the various inflamma-

tory and other morbid phenomena with which that migration is associated.

To discuss the migration of gall-stones apart from the consequences of that migration and the inflammatory mischief with which it is associated is scarce possible. Meantime, however, we shall confine our attention to the migration of gall-stones and a few of its direct consequences, leaving the discussion of other lesions connected with that migration to a subsequent chapter.

What, then, are the causes that lead to the migration of gall-stones?

The forces concerned in the expulsion of bile are doubtless the pressure exerted by the liver, and the contractile power of the gall-bladder and bile-ducts. Without entering into any discussion as to the precise amount of force exerted by this means, suffice it to say that the force sufficient in ordinary circumstances to expel bile is not strong enough to expel gall-stones. What, then, are the forces concerned in the expulsion or migration of gall-stones?

1. The popular idea is that stones are set in motion by a sudden jerk or fall, or the jolting of a conveyance. At first sight it might appear that there is a good deal to be said in favour of this idea. A sudden jerk or fall has not infrequently led to the perforation of a duct by a stone and the onset of peritonitis. Physicians in Carlsbad and elsewhere state that patients frequently suffer from severe attacks of biliary colic when coming to them by rail or other conveyance, but I cannot find anywhere the nature of these attacks so definitely described that it would not be possible to conclude that the patient was suffering from peritonitis or distension of the gall-bladder rather than from the passage of a stone. For my own part I am convinced that the popular impression is wrong, and that very seldom indeed does a fall or the jolting of a conveyance lead to an attack

of the biliary colic that is produced by the passing of a stone. I have seen many cases of biliary colic, but cannot recall a single instance where I could attribute it to a fall or the jolting of a conveyance. When we consider the dependent position of the gall-bladder we can at once see how difficult it would be, unless the bladder were much contracted, for a sudden jerk or the jolting of a conveyance to lead to this result. If the bladder be much contracted and a stone resting on the opening of the cystic duct, or if a stone has already nearly ulcerated its way through the bladder or ducts, we can readily understand how mischief can ensue, but not otherwise. For about twelve months I continued work while suffering from frequently recurring attacks of colic. These attacks occurred at all times, and apart from a stooping position to which I shall presently refer, I know nothing in my occupation that gave rise to them. It is true I often suffered a great deal when driving from severe dragging pain in the abdomen, and found some relief by holding on to the back of the conveyance. This I attributed at first to the passage of stones, but after noting more carefully the character and seat of pain, I found it was due, not to the passage of a stone, but to distension of the gall-bladder and the tearing of adhesions. If search were made in the motions, and if the seat and character of the pain were carefully noted in those who had attacks of biliary colic after driving, or journeying by train, I believe it would be almost always found that they were due to the causes just mentioned, and not to the passage of a gall-stone.

Reference has been made to the attacks of pain that not infrequently occur when one has been some time in a stooping position. On several occasions when stooping over a desk or an operation I have been suddenly attacked by severe pain. One occasion I specially remember: I had just been saying to a friend that I felt remarkably well,

and trusted that I had now come to an end of these attacks. After proceeding to write a few minutes in what, it must be confessed, was too stooping a position, I was suddenly attacked by excruciating pain which lasted many hours. It is somewhat difficult to understand how an attack of biliary colic could be induced by stooping a few minutes; but so often have I found these attacks recur after stooping a quarter or half an hour that I cannot help believing there is an intimate connection between a stooping posture and biliary colic.

2. However natural it might appear that a jerk or fall or the jolting of a conveyance should cause the dislodgment of a stone, there is another cause, the reasonableness of which will appear as soon as mentioned, and to this we must attribute in almost every case the migration of stones.

When an irritant substance finds its way into the body, be it dust into the eye or some indigestible substance into the stomach, Nature at once tries to dislodge it. If the foreign body is not septic and causes no mechanical irritation, Nature often allows it to rest in quietness. Let us illustrate by a comparison with the urinary bladder, with the functions of which we are better acquainted than with those of the gall-bladder: In old age or where there is no inflammation of the coats of the urinary bladder, a smooth stone, though tolerably large, may cause but little inconvenience; when, however, the stone is rough, the bladder distended with urine or its interior surface inflamed, then follows a feeling of distension, pain, and straining to pass water. Even when there is no stone in the bladder, when its lining membrane is inflamed by septic or other cause, the contraction and straining to pass water is frequent and sometimes almost incessant. There is no reason to doubt—in fact everything goes to prove and practically all are agreed—that it is in like manner distension with deteriorated bile or

mucus or muco-purulent fluid, that urges the gall-bladder to expel its contents.

If the gall-bladder is not distended with bile, mucus or pus, if its lining membrane is healthy and the calculi smooth, post-mortem records clearly prove that they give no trouble by migration. In connection with this we may refer to the fact that one is seldom called to relieve the pain of biliary colic in elderly people, the reason probably being that in old age the contractile power of gall-bladder and ducts is weak, and the lining membrane less sensitive. Thus, then, there seems to be good ground for regarding this as a fact which on no account must be forgotten—namely, that in practically all cases it is this distension of the gall-bladder and inflammation of its walls that lead to the migration of stones and attacks of biliary colic.

We must not, however, omit to say that Riedel finds some difficulty in accepting this as a full explanation. 'How comes it,' he says, 'that a gall-bladder may for years be distended with mucus or pus, and the patient have no attack of biliary colic, till at some particular hour or minute of a certain day of a certain year he is suddenly attacked with pain quite evidently due to the migration of a gall-stone?' He is inclined to believe that there must be some other factor, a something (*etwas*) to explain the occurrence of an attack at this particular moment. It would just be as difficult to explain why anyone who for months or years has been entirely free from gout should, on some particular night, wake up with pain in a joint. There are many things uncertain in medicine, but I have no doubt that the explanation is as given in these pages, namely, that there has been some change in the patient's mode of life. He may have been stooping for hours over a desk, or some abnormal product of indigestion may have been conveyed to the liver, and, being excreted with the bile, has acted as an irritant.

We shall now proceed to consider the course taken by a stone when set in motion by the contraction of ducts or gall-bladder. When a stone has been set in motion one of three consequences must necessarily follow: (1) it must either pass directly through the ducts into the duodenum, or (2) become impacted in the ducts, or (3) rupture the ducts or gall-bladder and find its way into the duodenum or elsewhere. To each of these modes of migration we shall briefly refer.

1. The stone may pass directly through the ducts into the duodenum. I do not suppose that when a stone completely enters the cystic duct it ever returns to the gall-bladder. It is true that much pain is often caused by a large stone, part of which has got wedged in the cystic duct, and doubtless a stone in this position, presumably after ulceration and relaxation of the walls, may again slip back into the gall-bladder. Nothing, however, has been observed that would render it probable that when a stone has completely entered the cystic duct it ever migrates in a backward direction.

The size of stone that passes directly through the ducts depends for the most part on the stage of the disease. Not infrequently in those who have suffered long from gall-stones one finds the ducts so much distended that they can admit a finger; and when this happens stones as large as a cherry or small plum can, of course, pass directly into the bowel, the outlet of the common duct, where the channel is very narrow, showing signs of ulceration. In the early stage of the disease I do not suppose a stone much larger than a pea is likely to escape being impacted or rupturing the ducts; even in that case the course is probably seldom direct. The stone may lodge for a time at the entrance into the common duct, or again where the common duct widens somewhat before its outlet through the coats of the duo-

denum. As will afterwards be more particularly mentioned in discussing the symptoms of this disease, it has not yet been found possible to say definitely whether the intervals of ease during attacks are due to a stone having entered the duodenum or only a wider part of the ducts.

Unfortunately, we have not always quite got rid of the trouble caused by a stone when it has passed through the ducts. When a stone has caused complete obstruction of the bowels, one generally finds that it has gained entrance into the bowels by perforating through the fundus of gall-bladder or the bile-ducts. In thirty-six cases of obstruction by stone Courvoisier, however, found that three had been caused by stones that had passed directly into the duodenum through the ducts.

It is somewhat difficult to understand how stones 3 inches in length by 1½ inches in diameter have been evacuated with little trouble, while others one-fourth of that size have been the cause of fatal obstruction. A stone passing into the duodenum is, of course, far more likely to be the cause of fatal obstruction than a stone which passes directly into the colon, but there are a few cases on record in which fatal obstruction has been caused by a stone which has passed into the colon. As Mayo Robson, however, has pointed out, obstruction is not always due to the mechanical blockage of a stone. It may also be due to the twisting of the gut through the violence of an attack of colic, to paralysis of the bowels caused by the surrounding peritoneal inflammation, or to stricture from adhesion, or a cicatrized ulcer. In inquiring into the causes of intestinal obstruction gall-stones should not be lost sight of, especially in the case of elderly women. Elderly women, as we have seen, are specially liable to stones, and we learn from statistics that it is in women over fifty years of age that three-fourths of the cases of obstruction of bowel by stone are found.

We need not discuss the symptoms and treatment of ntestinal obstruction by stone, as they are practically the same as when obstruction is due to some other cause, with exception, perhaps, of what has been stated by Naunyn, that when the obstruction is due to the mechanical blockage of a stone there may be a passage of flatus even when the obstruction is obstinate or fatal.

2. The stone may become impacted in the ducts. Stones sometimes increase considerably in size after leaving the gall-bladder. It is well known that though by far the largest number of stones are formed in the gall-bladder, they may also form in the intra- and extra-hepatic ducts. From the lining membrane of the ducts, as well as gall-bladder, are excreted cholesterin, lime, and other materials that go to the formation of stones, and it is the excretion of these same materials in the ducts that often leads to a considerable increase in their size. That this enlargement does take place in the ducts is evident from the form and structure of many stones that have been found impacted.

Not one, but many stones may lie impacted in the ducts, closely embraced or adherent to the walls, or imbedded among pus, cholesterin or other débris. How long it is possible for stones to lie impacted in the ducts we know not, but unless they be of so irregular shape as to allow the passage of bile certain consequences must necessarily follow. To one of these—namely, jaundice—we must now refer.

It is strange with what complacency the patient and even the medical man sometimes hails the advent of jaundice. There may have been many surmises as to the nature of the disease from which the patient suffered, but when jaundice appears the diagnosis of gall-stones is regarded as fully confirmed. I know no reason for hailing with satisfaction the

advent of jaundice. In practically all cases there ought to be no doubt as to the nature of the disease long before the advent of jaundice, while after all it may be found later that the jaundice was due to some entirely different cause. Further, when a stone has become firmly impacted, there is no certain prospect of speedy relief, but one has to look forward to the possibility of rupture of the ducts, septic poisoning, or death by exhaustion.

Let this, then, be duly remembered, and let no one question it, nor dally with the disease under some vague impression that, notwithstanding every symptom pointing plainly to the fact that the disease from which the patient suffers is gall-stones, there may be no gall-stones because there is no jaundice. Turn to the diagrammatic representation at page 13, and it will at once be seen that a gall-bladder may be distended to its utmost capacity with bile or stones, and the cystic duct completely blocked, and yet there is not necessarily jaundice. A glance at the diagram will at once show that it is only when the passage of bile through the hepatic or common duct is entirely prevented that jaundice is complete. At the same time be it remembered that though the blockage of ducts is generally due to a stone, it may also be caused by mucus or pus in the bile-ducts, by cicatrized ulcers, adhesions, the pressure of a growth, or by paresis of an over-distended gall-bladder. For a few days after operation, though all stones have been removed, there is generally more or less jaundice, owing to the inflammation and effusion in the ducts caused by the mechanical irritation of the surgeon's knife. Whether jaundice can arise from paresis of the liver cells, is, as we have already said, a question, the discussion of which would be beyond the limits of our space.

The distension of bladder with bile, mucus and pus, and the other consequences produced by a stone blocking the

ducts, will be more conveniently discussed in the next chapter.

3. If stones do not pass directly into the duodenum, nor become impacted in the ducts, only one other course is possible: they must make their way through the walls of bladder and ducts into the intestines or elsewhere.

In practically all who suffer from gall-stones, there is at some time or other tenderness over the region of the gall-bladder. To what is this tenderness due? Is it a referred pain? Is it due to a bladder distended with bile, a duct impeded with stones, or a localized peritonitis? The cause of the tenderness it may not be always possible to determine, but there is sufficient evidence to show that practically every one who has suffered from gall-stones, has also suffered more or less from peritonitis. Post-mortem examination shows that there is practically always acute inflammation of the peritoneum, or the results of old inflammation in the form of adhesions are found in those who have suffered from gall-stones. We have also the authority of surgeons who tell us they practically never operate without finding more or less peritonitis or adhesions; nor is there reason to doubt that this peritonitis, happily in most cases localized, is a merciful provision of Nature, not only in warning the patient as to the nature of the disease, but in preventing more serious consequences. Were the gall-bladder and bile-ducts not surrounded by thick inflammatory tissue, the stones, which produce ulceration of the walls, would readily rupture into the peritoneum. Sometimes, though happily but seldom, when there is little or no surrounding wall of infiltration, the stones burst through the ducts, and bile is poured into the abdomen; there is sudden pain, and the abdomen increases in size day by day. This enlargement may continue for days, and yet when the bile is withdrawn by opening the abdomen, or, as has been said, in some cases

even by paracentesis, there may be a good recovery. When, however, the bile is much contaminated, and pus, mucus and other débris are thrown into the abdomen, the result is generally fatal unless the surgeon intervenes, and not infrequently when he does. In such cases no one, however, would hesitate to say that the most practical course is to cut down, wash out freely, and if possible—which it but seldom is in the exhausted state of the patient—to find out and close the opening, or remove the gall-bladder if it is the gall-bladder that has been perforated. Emergencies of this sort will doubtless sometimes arise, and the general practitioner in a large town can send his patient to the hospital, or call in the consulting surgeon. Happily, in the country the general practitioner has not yet entirely abandoned the practice of surgery, nor is it with him, as with many of his *confrères* in town, a forgotten art.

Though perforation is not an uncommon occurrence, as is evident from the fact that fistulæ are found in about one in every fifteen who have suffered from gall-stones, the consequences are by no means always so serious as those we have just mentioned. That ulceration does occur in nearly all cases where a stone has remained a considerable time in one position is probable; that it by no means always leads to perforation is evident from the ulcers, cicatrices, and pouches in gall-bladder and ducts that are often found after the expulsion of stones. When the bile is healthy, the tendency to ulceration is, of course, considerably less, and a continuous flow of healthy bile may so wash out all septic materials that a bladder whose walls had become quite shreddy may be restored to a healthy condition, bearing only the marks of old cicatrices.

In those who have suffered from gall-stones, there lies in most cases, as we have said, an amount of inflammatory material round bladder and ducts. Part of this inflamma-

tory effusion may break down, and in that case abscesses are formed in which stones not infrequently are lodged, the stones having made their exit by eroding the bladder or ducts. Naunyn states that a pericholitic abscess opening into bladder or ducts may also account for this escape of stones. Perforation by this latter method has not, however, been proved, and if it does take place it is certainly a rare occurrence.

Here, then, around bladder and ducts we have a mass of inflammatory effusion, by means of which stomach and duodenum, small and large intestine, bladder and ducts may be more or less completely matted together. Stones which have ulcerated through bladder or ducts follow the path of least resistance till they find entrance into the nearest hollow viscus. Happily, most find their way into the duodenum or colon, and judging from the fact that stones are often voided per rectum by those who had not for a long time before complained of biliary colic, we may naturally conclude that, apart from other complications, this process gives little distress to the patient. There is always, however, the risk of severe bleeding, or the intestinal obstruction to which we have already referred. I do not think the fact that severe or even fatal bleeding may arise from this source is always remembered as a possibility by medical men. When there is pain in the region of liver or stomach, and a large quantity of blood is vomited or passed from the bowels, the patient is generally regarded as suffering from gastric ulcer and treated accordingly. Were the seat and character of the pain carefully observed, together with the history of the case, it would sometimes, not infrequently in fact, according to the statistics of Naunyn and others, be found that the bleeding arose from an entirely different source, and the patient have a better chance of life than if he were treated for gastric

ulcer. I can recall one case of bleeding so severe as to have proved all but fatal. The patient had undergone operation for gall-stones, but did not afterwards escape biliary trouble. After recovering from the effects of bleeding there was not anything that pointed to the existence of gastric ulcer.

Probably about two-thirds of the stones which perforate through bladder and ducts pass into the duodenum or colon. Were we to include those which pass into the duodenum by ulceration through the outlet of the common duct, the percentage would be considerably increased. It will be remembered that the outlet of the common duct is extremely narrow, and that the last $\frac{3}{4}$-inch of its course is through the coats of the duodenum. It is thus evident that a stone of any considerable size which has reached the outlet of the common duct will naturally finish its course by ulceration.

The stones that have found their way into the stomach or urinary passages have been so few as to be scarce worthy of mention.

Occasionally, though rarely, one finds a patient who expectorates bile. This is more frequently due to the bursting of a hydatid cyst than to gall-stones. Sometimes, however, an abscess in the neighbourhood of the gall-bladder makes its way through the diaphragm, entering into the pleuræ or pericardium, and this leads to the expectoration of bile.

We may suspect, but as already said, I do not know any means by which we can diagnose with certainty that a stone is making its way into some internal organ. When a quantity of pus is found in the walls of the abdomen, and a stone is expelled, there can be little doubt as to its source. Cases of the kind are easily observed and well remembered, but the exit of a stone through the skin is a rare occurrence.

When this does occur, the point of exit is generally in the region of the umbilicus, the stone following the course of the obliterated umbilical vein.

The discharge of a stone through the walls of the abdomen by no means implies recovery from the disease. Other stones probably still remain in the bladder or ducts, and even though they are discharged, the sinus does not always prove easy of cure.

From what has been already said as to the grave consequences that sometimes follow the migration of stones, it will be evident that too much attention cannot be paid to the diagnosis and treatment of the disease in its earliest stages, as afterwards complications may arise which it is not easy to combat. The further consequences of this migration we shall discuss in the following chapter.

CHAPTER III

MORBID CONDITIONS ASSOCIATED WITH GALL-STONES

OUGHT we to say that a person suffers from gall-stones or cholelithiasis? We find the following among other terms used to express the different forms of the disease: Catarrhal, infective and suppurative cholangitis, catarrhal cholecystitis, suppurative cholecystitis, parenchymatous or phlegmonous cholecystitis, pericholecystitis, calculous hepatitis, hydrops cystidis felleæ, etc.

These words seem sufficiently long, but they shrink into insignificance compared with the words used by surgeons who have written about operations on the gall-bladder.

The following are a few, but others with which I cannot keep pace continue to be added: cholecystotomy, cholecystostomy, cholecystectomy, choledochotomy, choledochostomy, cholecystenterostomy, choledochenterostomy, duodenocholedochotomy, duodenocholedochenterostomy, cholecystendysis, cholelithotrity, choledochoenterostomy, etc.

In the early part of the nineteenth century medical men wrote Theses in Latin to show that they belonged to a learned profession. Surgeons now use Greek. Diseases and operations connected with the gall-bladder are surely complicated enough without puzzling even medical men with such outlandish terms. Unless specially desirous of making it known

to the world that we belong to a learned profession, which demands from some at least of those who enter its portals a superficial knowledge of Greek, I think we might be content to say that a person suffers from gall-stones rather than cholelithiasis, and discuss the diseases and operations connected therewith in plain language; for the sake, however, of those who prefer the longer words, we shall insert them occasionally in brackets.

A very convenient mode of gaining a knowledge of the changes in gall-bladder and bile-ducts, produced by or associated with gall-stones, is to visit a pathological museum. Here we find bladders and ducts in endless form and variety. We have gall-bladders shrivelled up like an old fig, or distended so that they can hold a pint or more of liquid. Here we find one with walls thin and almost transparent, and the lining membrane clear and glistening. In some the walls are thick and the inner lining rough, shreddy, or pouched; in others they are perforated in one or more places, or are of a dark plum colour, or have dirty dark gray patches, or are entirely gangrenous.

In order to understand what are the contents of these gall-bladders we must visit post-mortem rooms, or rely on the statements given us by surgeons. In one we have no bile, but a clear, colourless, slightly viscid secretion. In another we find thick ropy mucus, with plugs like boiled sago. In another the bile may seem normal, and yet it contains a considerable number of bacteria. In another we have a few pus cells and other débris mixed with the bile, or the contents may be entirely purulent. In another we find a small growth adherent to the walls, or the growth may be large and solid filling the bladder, or broken down with stones among the pus and débris. In a few we find hydatids or other foreign bodies, and in many, but not in all, we find stones.

Though gall-stones be not found post-mortem, nor by the surgeon who cuts down on the gall-bladder, that is no proof that the pathological changes in the duct or bladder have not been brought about by stones. There are often lesions sufficient to prove that they had not only been present at some past time, but had been productive of serious mischief. Notwithstanding, there still remains about 20 per cent. of these abnormal gall-bladders in which not only are no gall-stones found, but where there is no evidence that they ever existed. For this reason, and to give it due emphasis, we did not follow up further in the last chapter the lesions resulting from the migration of stones, but devote a special chapter to morbid conditions that do not always directly arise from, but are in 80 per cent. of cases associated with stones.

Let us again look round the array of bladders and ducts in a museum, not one of them normal, every one bearing the marks of disease, and for the most part in so notable form that the most untrained eye could not fail to be struck by their vast variety—bladder and ducts shrunk or distended, with walls thin almost as writing paper or an inch or more thick, smooth and white, or coarse, dark, and shreddy, the contents consisting in no case of pure bile but of mucus or pus—and ask ourselves the question, Is there any one cause from which all these pathological changes have proceeded?

The question, so far as I can see, is one which does not admit of a direct answer. Certain it is, at least, that all these pathological changes cannot be accounted for by the mechanical irritation of a stone. When we have a large gall-stone blocking for a time the cystic duct, or the stone is rough and jagged, producing mechanical irritation, it will doubtless cause certain changes in the size and form of the gall-bladder. But gall-stones are themselves the result of inflammation, and when we find so many gall-bladders in

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which stones have rested probably for many years differing in no way from the normal, I cannot help thinking with Kehr, that these abnormalities to which we have referred are all but entirely due, not to mechanical but to septic and chemical irritation.

The different types of lesion produced we shall now proceed to describe. We shall not attempt to classify, for no classification yet given is satisfactory, and in the present state of our knowledge a satisfactory classification is probably impossible. There are prominent types, but they run into each other by such steady gradations that it would be often extremely difficult to say to what particular category an individual case should be referred. For the benefit of those who have no book on the subject at hand, I shall give the classification of Mayo Robson in the second edition of his work on 'Diseases of the Gall-bladder and Bile-ducts.'

Besides a classification of tumours or distended bladder and ducts we have the following classification of inflammatory affections:

1. **Catarrhal inflammation**: (*a*) acute catarrhal cholangitis; (*b*) chronic catarrhal cholangitis; (*c*) chronic catarrhal cholecystitis.

2. **Croupous inflammation** of the gall-bladder and bile-ducts.

3. **Suppurative inflammation**: (*a*) simple suppurative cholecystitis, or simple empyema of the gall-bladder; (*b*) suppurative and infective cholangitis; (*c*) acute parenchymatous or phlegmonous cholecystitis and gangrene of the gall-bladder; (*d*) ulceration of the gall-bladder and bile-ducts; (*e*) pericholecystitis and adhesions; (*f*) stricture of the gall-bladder and bile-ducts; (*g*) perforation of the gall-bladder and bile-ducts; (*h*) fistula of the gall-bladder and bile-ducts.

Contraction of the Gall-bladder.

We shall now resume our walk through the pathological museum, and describe what we see without any attempt at classification. The first type of gall-bladder we meet with is one which has not been classified and has not received a Greek name; it is much smaller than the normal gall-bladder, its walls are thick, and its cavity lessened or almost obliterated. Contrary to what one might expect, this is the form the gall-bladder takes in the great majority of those who have suffered long from gall-stones. Repeated attempts to eliminate the stones have led to an increase of the muscular fibres, and to their gradual replacement by fibrous tissue, which thickens and contracts and narrows, or almost obliterates the cavity. If, then, in the great majority of those who have suffered long from gall-stones we expect to find an enlarged or distended gall-bladder, we shall be disappointed.

Simple Catarrh of the Gall-bladder.

Here is another type of gall-bladder which one seldom, however, finds in museums, as it differs in appearance little if at all from the normal bladder, and though it may be found in those who have died from other diseases, is itself, I should think, never the cause of death. According to Mayo Robson, it forms a distinct and definite disease (chronic catarrhal cholecystitis). The bladder may be somewhat distended, but differs little from a normal bladder unless it has been altered by previous attacks of gall-stones. The contents consist of 'bile mixed with thick ropy mucus, which form plugs almost like small grains of boiled sago.' Doubtless plugs of this sort may cause pain, but pain that can surely be distinguished from the passage of gall-stones. Mayo Robson himself says: 'The diagnosis from cholelithiasis may usually be made by observing that the attacks

are less severe and less prolonged than in true gall-stone seizures; that no gall-stones are found in the evacuations after an attack; that jaundice seldom supervenes, and if it does is only very slight; that there is no tenderness on pressure between the ninth costal cartilage and the umbilicus; and that the affection will usually and completely yield to treatment. Should medical treatment fail to relieve, it may be difficult to distinguish chronic catarrh of the gall-bladder from cholelithiasis; but if, under the belief that the case is one of gall-stones, the gall-bladder is exposed, and no concretions found, drainage of the gall-bladder will be likely to effect a cure.' Quite possible, if the patient recover. It seems almost incredible that operation is ever resorted to in such cases as these, and yet the surgeon referred to mentions several, and in one of these 'no good resulted from the operation.' It is well known that nowadays there is, on the part of some medical men and surgeons, and even patients themselves, a craze for operation, but one is extremely surprised to find that an operation not trifling, but severe and even dangerous, is ever resorted to in such cases as this. They are familiar enough to medical men in regular practice, even with the addition of a sign, the absence of which is noted by Mayo Robson—namely, tenderness between the ninth costal cartilage and the umbilicus. It must surely be seldom that there is any difficulty in distinguishing between such cases as these and cholelithiasis. Their cure—that is, when they do not recover without treatment at all—is familiar enough to every medical man, and he does not find it necessary after the means employed to make a special note of the fact that the patient recovered.

Dropsy of the Gall-bladder.

Next we have the typical bladder of dropsy (hydrops cystidis felleæ). This is practically always distended, some-

times even to so great extent that it is capable of holding a pint or more of liquid. When thus distended it has been mistaken for an ovarian cyst, and a case is reported in which it was found passing with hernia through the femoral ring. The walls are mostly thin and smooth, and when emptied of its contents and inflated with air, it is not unlike the inflated urinary bladder of one of the lower animals. The contents, consisting originally of bile, gradually give place to a colourless, viscid, whitish fluid, which in course of time occupies the whole bladder, the bile-pigment being entirely absorbed by the lymphatics, and passing along through the thoracic duct.

One would naturally suppose that a dropsical effusion of this sort was always due to an obstruction of the bile-ducts, were it not that in a considerable number of cases, especially after typhoid fever, no stone is found, nor any evidence that stone ever existed. In the great majority, however, there is a large stone at the gall-bladder end of the cystic duct, or occasionally one or more are found in the common duct. Kehr is strongly of opinion that though stones may exist this dropsical effusion is practically never due to an impacted stone, but is to be attributed to the disappearance of a temporary infection. According to Kehr, the *Bacillus coli* finds its way into the gall-bladder, sets up inflammation, and causes distension of its walls. After the disappearance of this organism the walls continue distended, while the infection has vanished. On this supposition, with a distended bladder and an open cystic duct, it is somewhat difficult to understand why the bile does not still find its way into the bladder. I do not know how Kehr explains this, but of course it is quite possible that the pressure exerted by the mucous secretion is greater than that exerted by the bile.

There are many vexed questions concerning the origin of

dropsy of the gall-bladder, the discussion of which would occupy much space, and probably be of little interest to most of our readers. The question for every practical man is: Ought a dropsical bladder to be opened and its contents removed?

It is an operation familiar to surgeons, and the reasons given are that the distension causes pain, and that operation removes the risk of reinfection and the formation of pus. Doubtless, if the pain is persistent, there is reason for the drainage or removal of the gall-bladder. Unless the pain were severe, I would prefer to retain it and run the risk of reinfection. In what manner microbes find their way into the bladder we know not, and if anyone can with certainty determine the mode in which they do enter he will be a great benefactor to those who suffer from gall-stones. Three methods are possible: by the blood, through the walls, or from the duodenum by the bile-ducts. Mayo Robson is inclined to believe the entrance is by the ducts. In that case when, as so often, dropsy is due to a stone occluding the cystic duct, there is little risk of microbes finding their way from the duodenum. If entrance be only by this method, and the bacteria that formerly existed in the bladder as well as all inflammation has disappeared, the bladder is practically as much outside the body as though it had been removed by a surgeon. A still stronger reason for non-interference lies in the fact that dropsical distension of the bladder in a large proportion of cases disappears of itself, and not seldom quite suddenly.

Gangrene of the Gall-Bladder.

We now come to another form of gall-bladder, which is a more legitimate field for the surgeon. It will be remembered that when Mignot introduced virulent micro-

organisms there was rapid formation of pus, and peritonitis so severe as to be generally fatal, but no gall-stones. This is what has been termed acute parenchymatous or phlegmonous cholecystitis, which is closely allied to gangrene. Within the bladder is found stinking pus, and the walls are of a dark plum colour or have dirty gray or green patches. Such conditions are extremely rare, and seldom found in a pathological museum. The symptoms are, as might be expected, severe pain, feeble and rapid pulse, intense depression, great tenderness on pressure, rapidly developing tympanites, and, unless relief be speedily obtained, the end soon comes. Provided the disease can be diagnosed and a skilled surgeon at hand, there seems every reason to regard operation as the most reasonable procedure.

Empyema of Gall-Bladder.

Happily in nearly all cases where pus is formed in the gall-bladder the attack is by no means so sudden nor the result so serious as what has just been described. In what has been termed empyema of the bladder (simple suppurative cholecystitis or suppurative catarrh) there is endless variety. There may be only a little pus mixed with the bile, or the contents may be entirely purulent; the bladder may be much enlarged, or not more than the usual size.

In the great majority of cases there are stones within the bladder or ducts, but, as in dropsy, there may be no stones, especially after typhoid and infective diseases; there is pain and tenderness on pressure, especially after driving or jolting. Provided there is a thick surrounding wall of inflammatory exudation there may be little or no fever, the micro-organisms not finding their way into the general system. In nearly all cases, however, we find at times chills and a rise of temperature. With still further infec-

tion, and when stones are resting at some particular spot, perforation can readily ensue.

There is a good old surgical rule, 'Ubi pus, evacua.' 'Needless to say,' says Mayo Robson, 'an abscess of the gall-bladder only requires treating on surgical principles by opening and drainage.' From the old rule, 'Ubi pus, evacua,' this does not necessarily follow. For the escape of pus Nature has provided a method which is often quite as satisfactory as surgical drainage. If the bile-ducts be open an escape for the pus is provided; further, an inflow of healthy bile may provide for the destruction or removal of the streptococci. Recall what has already been said as to the experiments of Ehrett and Stolz: Inject a culture of streptococci into the gall-bladder; the bile-ducts clear themselves very rapidly of the microbes thus introduced, and after eight days the bile is as aseptic as it is in the ordinary state. This is precisely in accordance with what Kehr states as a result of his clinical experience, that infection of the gall-bladder and collections of pus frequently disappear. Most medical men who have had much to do with gall-stones can recall cases where there was tenderness over the gall-bladder, occasional, even frequent chills, and high temperature, with or without distension, and these symptoms have entirely disappeared. I have in my mind at this moment a case recently seen with another medical man. The medical attendant informs me that two years ago the bladder extended considerably beyond the umbilicus; it is still enlarged, but to no great extent. The patient, seventy years of age, attends actively to his business, and for a long time past has not suffered any pain or inconvenience, nor indeed at any time so much pain or discomfort, or been prevented from work to the extent that would have been entailed by operation. This is quite apart from the loss of strength and greater liability to disease which,

with all respect to surgeons, medical men so often find after operation. I have seen other cases where the symptoms of empyema have disappeared more rapidly. In a word, provided the ducts are open, a free flow of healthy bile will displace the pus, and probably as effectually cleanse the bladder as any of our antiseptics. In the event, however, of a stone blocking the duct, and not being dislodged, a time will doubtless come, if the symptoms are urgent, when operation may be advisable.

Adhesions.

Some of the greatest achievements of gall-bladder surgery have been accomplished by surgeons who have not opened the gall-bladder, or having opened it have found no stones. Medical men standing by sometimes express disappointment. The patient and relatives also are disappointed because no gall-stones are produced, and yet really good work has been done. Long after attacks of biliary colic have ceased there remain not infrequently severe and dangerous disorders of stomach and bowels, which are often referred to some other cause. The inflammatory exudation round the bladder subsides, but it gives place to fibrous adhesions between gall-bladder and stomach or bowels, interfering with peristalsis, and often preventing in greater or less degree the passage of flatus or food (adhesions after pericholecystitis). These adhesions almost invariably produce a pain which will be afterwards described. Associated with this pain there may be only some slight disorder of stomach or bowels, but in other cases the pylorus or colon may be so dragged upon or contracted that the most serious consequences ensue. When we find a patient gradually wasting, with great distension of stomach and possibly some thickening at its outlet, we generally refer it to a cicatrized gastric ulcer or malignant disease, whereas a careful inquiry

into the past history might afford clear evidence that the patient is suffering not from gastric ulcer or malignant disease but from adhesions obstructing the pylorus or some part of the intestinal tract. In some of these cases surgical procedure is easy and is followed by striking results; there are others in which the most brilliant operator could scarce hope to succeed. Take, for example, a case figured and described by Fleiner in the *Münchener Medicinische Wochenschrift* of September 18, 1900. Here we have a shrunk gall-bladder with hour-glass contraction. Some stones lie in what appears to be part of the gall-bladder, while others have perforated into stomach and pylorus. The colon is dragged upwards and firmly fixed, while a flexion at the outlet of the stomach is so acute that it is practically impossible for any food to pass.

Life would probably be more prolonged in a case of this sort by rectal feeding after the stomach had been emptied than by operation. At the same time, as we have said, there are doubtless many suffering from adhesions who, after massage and the stomach tube have failed, would be benefited by operation.

Affections of the Bile-ducts.

Closely associated with gall-stones are catarrhal, infective, and purulent inflammation of the bile-ducts (catarrhal, infective and purulent cholangitis). We need not discuss these at any length, as what has been said as to diseases of the gall-bladder applies for the most part to the ducts, the lining membrane of both being continuous; and just as we have seen that the large proportion of diseases of the gall-bladder—80 to 90 per cent.—are connected with stones, so also we find that to this same cause are due almost all serious affections of the bile-ducts. Among these serious affections is not, of course, to be reckoned the ordinar

simple catarrh dependent on the irritation of deteriorated bile or the extension of catarrh from the duodenum. The foul tongue, disordered digestion and slight yellowness of the conjunctivæ are of everyday occurrence, and how far this may be dependent on a mild catarrh of the bile-ducts or inadequacy of the liver cells it is not our province here to discuss.

Where the ducts are infected with virulent organisms, or distended with pus in which stones may or may not lie embedded, the consequences are generally serious: there is shivering, high temperature, marked loss of strength, and generally more or less jaundice. There may be abscess of the liver, pneumonia, endocarditis, or any of those numerous conditions that may result from the extension or absorption of pus. This disease is of special interest when it exists, as it occasionally does, apart from gall-stones, and as it is so often mistaken for intermittent fever, from which it is seldom possible to distinguish it, except by the fact that, unlike intermittent fever, it does not yield to quinine.

Cancer.

We cannot conclude this chapter without drawing attention to the fact that gall-stones are occasionally the precursors, and it is to be feared it must be admitted even the direct cause, of malignant disease. It is true that surgeons in this country have not attached so much importance to the fact that malignant disease sometimes follows gall-stones as to regard it as affording a reasonable ground for operation. In Germany it is otherwise, and Kehr, whose operative zeal is not so great as that of some of our English surgeons, nevertheless regards a hereditary tendency to cancer as a strong reason for urging the patient to submit to operation, when on other grounds it might not appear absolutely necessary.

We need not discuss the different forms assumed by

cancer when it attacks the gall-bladder or bile-ducts. There may be a hard mass obliterating the cavity of bladder and ducts and matting together the surrounding organs, or the patient may collapse through the effects produced even by a small nodule occluding the ducts. The two important questions we have to consider are: (1) Are gall-stones in themselves a cause of malignant disease? and (2) if so, Is this a frequent occurrence? To the first of these questions there seems to be now sufficient ground for giving a direct answer. As to the second, before a direct answer can be given the results of far more extensive observation must be got and tabulated.

(1) Are gall-stones in themselves a direct cause of malignant disease? In order to answer this question a clear distinction must be drawn between primary and secondary cancer of gall-bladder and bile-ducts. There are exceptions, but this is a distinction which most skilled pathologists regard as quite possible. I do not know that it can be better expressed than in the words of Cecil Beadles, whose valuable contribution to the subject is to be found in vol. xlvii. of the *Transactions* of the Pathological Society of London. Apart from microscopical differences on which Beadles does not lay great stress, he states that 'so far as my experience goes, primary cancer of the liver differs very markedly from secondary cancer in its situation and naked-eye characters, so that being unaware of malignant disease elsewhere in the body we could scarcely be led astray in venturing an opinion as to the origin of the disease in the liver. While metastatic deposits are invariably scattered about the organ, varying much in number and size, they are always of rounded form, and when many in number are distributed more or less uniformly, and not massed particularly about the gall-bladder or quadrate lobe. On the other hand, primary malignant disease forms a hard uniform

scirrhous mass, if not involving at least close upon the superior wall of the gall-bladder. It affects the anterior region of the liver towards its free edge, where it usually involves its entire thickness. From this region it invades the organ backwards and outwards to the right and left, and spreading, tongue-like prolongations of the growth extend beyond the general mass. Sometimes the walls of the gall-bladder are involved in the growth, and on rarer occasions still there is an actual part of the neoplasm projecting into the cavity of that viscus, usually from the upper or hepatic wall. But most frequently the walls of the gall-bladder have more or less escaped disease, and the biliary passages are obliterated up to their very entrance into the bladder, the growth having all the appearance of being developed more or less close to the orifice of the duct, and spreading thence into the soft tissue formed by the liver cells.'

As regards the relation between gall-stones and primary and secondary cancer there are two important facts to be noted: (*a*) That when the cancer is primary, gall-stones are found in practically all—at least, over 90 per cent.—whereas (*b*), when the cancer is secondary to that in some other organ, gall-stones are so seldom met with that their presence can only be regarded as a mere coincidence and no causal relation possible. 'In 100 consecutive post-mortems on persons who died from some form of malignant disease in the Cancer Hospital, 36 had deposits in the liver secondary to disease elsewhere, and 4 had what seemed to be undoubtedly primary disease of the liver. All four of the liver growths were associated with calculi in the gall-bladder, whereas in not a single one of the thirty-six cases of secondary disease were any calculi found, nor were they present in any of the remainder of the hundred cases' (Beadles). In the conclusions which

Beadles draws from this and other observations he is quite in accord with most other pathologists, who affirm that for one case in which cancer has primarily attacked the gall-bladder and ducts there are ten in which it has had its origin elsewhere, and that whereas primary cancer is practically always associated with stones, stones are but rarely found when cancer of the gall-bladder is secondary to that in some other organ.

We need not weary the reader by entering into endless statistics, but the fact seems plain that when cancer primarily attacks the gall-bladder and ducts, it is due to the irritation produced by stones, and that the formation of stones is practically never the result of malignant disease. When malignant disease has so far developed as to cause obstruction of the ducts, it is extremely improbable that the few weeks or months the patient survives afford sufficient time for the formation of stones. In further proof of the fact that the gall-stones are primary and the cancer secondary, we may add that it is notably old people and women who suffer in greatest numbers from gall-stones who succumb to cancer of the gall bladder and ducts.

While the facts are as stated, and those of us who have suffered from gall-stones would gladly conclude otherwise, we are compelled to admit that in a certain number gall-stones sooner or later become fatal through the development of malignant disease. In saying that malignant disease is due to gall-stones, be it understood, however, that we use the term 'gall-stones' in its widest sense. I do not suppose malignant disease is always due to the mechanical irritation produced by the calculi themselves. It is true that the exact point of origin, so far as can be made out, is frequently the opening of the cystic duct, and it is this spot that is subjected to most irritation through stones trying to find their way from the gall-bladder into that duct.

At the same time it is to be remembered that it is orifices of this sort, where there is a gradual change in the character of the cells, that are the most liable to malignant disease, and it is in the ulcers or cicatrices, which, as we have seen, are caused not only by the attrition of gall-stones, but are occasionally found in inflammation of the bladder and ducts, quite independent of stones, that the disease has its origin.

(2) Granted that in some cases malignant disease is caused by gall-stones, the further equally important question arises: Is this a frequent occurrence? Even though we admit that malignant disease of the gall-bladder in nine cases out of ten is the direct result of gall-stones, this fact nevertheless is of little importance provided, as is generally supposed, that cancer originating from gall-stones is but a rare occurrence. But little attention has been directed to this question. Practically every text-book in medicine refers to it, but neither in these nor in works devoted specially to diseases of the gall-bladder and bile-ducts does one find anything beyond the reference, which is almost never omitted, to Schröder, who states that 14 per cent.—in other words, one out of every seven who have gall-stones—afterwards develop cancer in bladder or ducts. This statement is certainly not pleasant reading to those who have suffered from gall-stones. It is not pleasant for those of us who have got rid of our biliary colic to reflect that after all there is considerable risk that some day or other we must succumb to cancer. As this statement recurs in so many text-books I determined to know whether it really had been made and on what basis it rested. To ferret out an unpublished thesis of uncertain date by a writer whose name is as common in Germany as Brown or Jones in England is no easy matter. I wrote several of the leading Continental and other writers who had quoted this statement, and while

acknowledging the obligation, and heartily appreciating their unfailing courtesy in replying to my letters, I found that not one of them had seen this thesis, but accepted its statements on the faith of some other writer who also had not seen it. The replies I received invariably stated that it was certainly contrary to their own experience, and that they thought it extremely improbable that cancer was so frequently associated with gall-stones. This thesis, in which are given many other valuable statistics quoted by every writer on gall-stones, I at length succeeded in procuring from an old bookseller in Leipzig, and now I find that Schröder has always been correctly quoted, and further inquiry has shown me that though his estimate of the frequency with which gall-stones give rise to cancer may be too high, it is nevertheless certain that malignant disease of the bladder or ducts follows gall-stones far more frequently than is generally supposed.

Schröder's estimate is founded on the basis of 1,150 post-mortems, in 141 of which were found gall-stones, and in 20 out of the 141 gall-stones were found associated with cancer of the gall-bladder and bile-ducts. The results were taken from Recklinghausen's clinique and carefully verified.

I have myself carefully gone over the records of post-mortems in Guy's Hospital during a series of years, in which special attention has been given to diseases of the gall-bladder and bile-ducts. From the beginning of 1893 to the end of 1899 are preserved the records of 3,448 post-mortems. In 149 there were found gall-stones, and in 14 of these along with the gall-stones was found cancer that had originated in the gall-bladder or in close proximity to it in the cystic duct. In two cases of cancer of the gall-bladder no stones were found, and in one there is no mention of stones; but from the dilatation of the common duct and other pathological conditions, there can

scarce be any manner of doubt that at some period of life they had existed. In case anyone may care to verify this statement, I append the following particulars, assuming that the three cases of cancer in the gall-bladder in which stones are not mentioned, or were not found, were also associated with stones.

	Post-mortems.	Gall-stones.	Primary Cancer of Gall-bladder or Cystic Duct.
1893 ...	507	21	2
1894 ...	495	13	1
1895 ...	516	25	3
1896 ...	536	22	4
1897 ...	483	25	2
1898 ...	449	16	3
1899 ...	462	27	2
	3,448	149	17

It will be observed that these results do not, after all, differ so much from those of Schröder. In 141 cases of gall-stones, he found 20 of primary cancer or 14 per cent. In 149 cases in Guy's Hospital we find 17 or 11·4 per cent.

Riedel (*Berliner Klinische Wochenschrift*, January 14, 1901) gives a somewhat less proportion. He states that of 500 to 600 gall-stone patients he has seen, not less than 43 suffered from cancer of the gall-bladder, the result of stones—that is, 7 or 8 per cent.

In a paper in the *Medical Chronicle* of 1897, Dr. Kelynack states that in 4,578 post-mortems he found eight cases of primary cancer of the gall-bladder and two of the bile-ducts. Proceeding on Dr. Brockbank's statistics we find that 6·6 per cent. of the patients in Manchester Hospital have gall-stones. Among these 4,578 we might therefore conclude that about 300 had gall-stones, and of these 10

developed cancer or 3·3 per cent. The number is decidedly less than those above given, but the basis on which I have taken the liberty to make this calculation is not so satisfactory.

I regret that I am unable, as yet, to give the reader more statistics on so large a scale as to form a basis for a definite reply to this question. Schröder's percentage may be found to be too high, but I do not see how we can resist the conclusion that, if not one in seven, at least one in ten or twenty of those who have gall-stones afterwards become the victims of malignant disease. In the record of the seven years in Guy's Hospital to which I have referred, I find that the number of deaths attributed to cancer arising from gall-stones is exactly the same as from all the other lesions which originated from or were associated with gall-stones.

There are many other points in connection with this subject that have yet to be determined. Musser found that in 69 out of 100 cases of primary cancer of the gall-bladder there were stones, whereas in 22 cases of cancer of the bile-ducts only 4 were found to be associated with stones. It has been observed by others that primary cancer beginning in the gall-bladder or cystic duct is far more frequently associated with stones than cancer in the common or hepatic ducts. To what cause can this be assigned, to the difference in the lining membrane, to the longer period in which stones lodge or bile stagnates in the gall-bladder? An answer to this question might contribute somewhat to our knowledge of the causation of cancer in other organs.

As already said, some of our leading German surgeons have regarded a cancerous diathesis as a reason for the removal of gall-stones. In this country a hereditary predisposition to cancer finds no favour among the leading authorities. Granted, however, that there were a hereditary or local predisposition to cancer, other difficulties lie in the

way before we can accept this as a reason for surgical interference. Riedel has said that cancer specially attacks those who have never suffered from biliary colic, nor been cognizant of gall-stones, and that when attention is drawn to the disease the cancer has so far developed that it can only be in exceptional cases that a radical extirpation is possible. I cannot entirely accept this conclusion of Riedel. I have inquired into a considerable number of cases, and find that in a large proportion there had been previous attacks of jaundice or of pain that might have drawn attention to the disease. Be this as it may, the whole subject requires more consideration before a medical man can be regarded as justified in handing over to the surgeon a patient who is supposed to have gall-stones merely because one in ten or twenty of those who have gall-stones afterwards become the victims of malignant disease.

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CHAPTER IV

SYMPTOMS AND DIAGNOSIS

In that comparatively small region that lies between the lower border of the ribs and cartilages and a line drawn at the level of the umbilicus, are found a large proportion of the diseases that call for treatment in ordinary practice. Occupying but a small portion of that region just round the spot where pain is mostly felt in gall-stones, we have stomach, pylorus, duodenum, gall-bladder, bile-ducts and pancreas all lying in close juxtaposition, and in the closest relationship physiologically and pathologically. To determine what particular organ is primarily attacked and in what manner is no easy task, and not seldom the problem baffles the most experienced and skilled observer. Not that it is of no importance : it is of the utmost importance to distinguish between a gastric ulcer and an inflamed gall-bladder, an impacted or perforated bile-duct, and the different forms of obstruction at the outlet of the stomach, as the treatment in these conditions is so widely different, and a life often depends on a correct diagnosis. Further, we have called attention once and again to the importance of an early diagnosis of gall-stones, as this is a disease which is specially amenable to treatment in its early stages, but which, in its later development, occasionally defies the skill of the ablest physician or surgeon.

No apology is therefore needed for dwelling with what some might regard as undue emphasis on certain minor points that materially aid in the diagnosis of the disease. I have a further reason for dwelling on these points: Since forming a but too intimate personal acquaintance with the symptoms of gall-stones, I have laid aside my preconceived notions founded on text-books, and find the only description given of the character and seat of pain that accords with my own experience to be that of medical men who have themselves similarly suffered.

1. **Pain.**—The first symptom that calls attention to, and is most intimately associated in the mind with, this disease is *pain*. Though pain is probably an attribute of all sentient existence—and no man or woman has ever lived who does not know what it means—still it cannot yet be said to have received the attention it deserves. Nowadays, when the superfluous energies of our ablest men are devoted to the study of germs and antitoxic serums, medical men of the older school are now and again heard to complain that we have not advanced beyond Hippocrates and the old physicians in appreciating the cardinal symptoms that lead to a correct discrimination of disease.

There are, it seems to me, several reasons why the precise character and seat of pain are not always carefully noted nor correctly described in our leading text-books: (*a*) The patient is often necessarily questioned about the pain when the agony is so great that he does not find it possible to accurately describe it. (*b*) It is seldom that the patient is again questioned as to the precise character and seat of pain till so long after that his memory fails to retain the impression, and he does not find it possible to precisely define it. Than severe pain nothing is more acutely felt nor so soon forgotten. Ask the man in the street the exact position and character of the pain when he last had tooth-

ache, and though it be only a week after, probably not one in a hundred will give a correct description. Ask a patient, on the other hand, when he next has an attack to carefully note the position and the character of the pain at the beginning, during the course and at the end of that attack, and more information will be gained from two or three individuals than from a hundred who had not been asked to note it. (*c*) Not infrequently a medical man makes a rapid diagnosis, and without much questioning suggests that the pain is in a certain spot. The patient naturally assents to his medical man's superior knowledge, and is content to believe that if the pain is not there it ought to be. Especially have I found this to be the case when the patient suffers from biliary colic. If the pain is in the knee, examination will be made as to the hip-joint, or if in the temples, as to the state of the teeth, but if the disease be regarded as gall-stones inquiry is but seldom made as to pain an appreciable distance from the gall-bladder. (*d*) When anyone has made a special study of a disease, it is but natural and right that we accept, or, at least, hesitate to question, any statement he makes on that subject. Gall-stones have now come to be regarded as the special province of the surgeon. Few surgeons, however, have the opportunity of observing the patient during the first attacks. An operating surgeon who devotes his time almost entirely to operation and consultation in serious cases has seldom an opportunity of watching the development of the first symptoms of gall-stones. Than the eminent operating surgeon himself no one knows better nor feels more the disadvantage under which he is placed in not being able to closely observe the first symptoms of a disease. Than Kehr of Halberstadt no surgeon has had greater experience in operating for gall-stones, and yet he himself states that he has seldom had an opportunity of observing the disease in its earliest stages, and urges medical

men in regular practice, who, during severe attacks, are visiting the patient daily or even hourly, to make use of those opportunities that are not accorded to the operating surgeon.

It is probably because the position and character of the pain has not been carefully observed that a few years ago biliary colic was always attributed to the stretching of the ducts by the passage of a stone, while the tendency now is to regard it as mostly if not entirely due to inflammation and distension, with subsequent contraction of the gall-bladder. It has been found after operation that when sterilized water or other fluid is injected and the gall-bladder distended pain is produced. I cannot find, however, in the statement made by surgeons, that the pain thus produced is equivalent to that caused by the passage of a stone. So far as I have observed, there are three kinds of pain, differing in position and character, and due to an entirely different cause. To each of these we shall briefly refer.

(*a*) There is the typical pain of biliary colic. We have already referred to what has been termed the 'prodromal stage,' which is associated with obscure pains in the lower part of the back, a stage denied by some surgeons, but which has been frequently observed by medical men. This pain is somewhat lower than that in the region between the lower angles of the shoulder-blades which is mostly due to some disorder of the stomach. It is somewhat higher and generally less severe than that of muscular rheumatism, for which it is at first generally mistaken. It is entirely different from true biliary colic.

We shall not weary the reader by quoting the description of biliary colic given by various writers, and which was in past times always attributed to the stretching of the ducts by the passage of a stone. These descriptions are mostly in the same terms. Let that of Naunyn suffice: 'The pains,'

says Naunyn, 'usually commence in the epigastrium, and afterwards spread into both hypochondria and to the back, where they are often felt not only to the right, but on both sides of the vertebral column. Sometimes they extend upwards to the head and neck, or downwards to the lumbar and even to the sacral region. Now and again they radiate into the upper part of the thigh and along the arms even to the finger-tips. Pain in the right shoulder is not, in my experience, by any means especially common in gall-stone colic, and is relatively much less frequent than in cases of hepatic abscess.' In reference to this description I can only say, that in several particulars it does not accord with my own personal experience, nor with what I have been told by others whom I had asked to carefully note the character and seat of pain. In the first attack, when the pain is generally attributed to some disorder or so-called 'cramp of the stomach,' it is usually referred, I admit, to the epigastrium. In subsequent attacks, the principal seat of pain is always regarded as the right hypochondrium. This, however, is of small importance.

The main point in which I differ from Naunyn and other writers on the subject is one which cannot be regarded as a matter of indifference to either the surgeon or the medical man in the diagnosis of the disease. After a long interval of freedom from attacks, when the pain begins suddenly, and presumably a stone enters the cystic duct, it is first felt neither in the epigastrium nor hypochondrium but in the back. On suggesting to a patient whom I had asked carefully to note the position of the pain at the beginning of an attack, that it began in the hypochondrium, she indignantly replied that I might know better, that she never sent for me when the pain began over the gall-bladder, that she knew that when the attack began with pain over the gall-bladder it was not likely to be serious, or at least slight compared with those attacks

which commenced with pain in the back. I have frequently had attacks of pain beginning in the right hypochondrium, but could never associate them with the entrance of a stone or its passage through the ducts. In every severe attack, when within the next two or three days I have found stones in the motions, the pain began over or somewhat to the right of the region between the eighth and the eleventh dorsal vertebræ. The sensation is difficult to describe. I can only compare it to what might be expected if the spine were being broken just as one would break a stick over the knee. This pain is only felt for a few moments in its greatest intensity in that position. It gradually passes round, and is succeeded by pain in the right hypochondrium, the pain in the back disappearing in a few minutes or being gradually merged in the more continuous pain over the gall-bladder. There, in the region of the gall-bladder, it holds its principal seat, but shoots about in all directions, to the corresponding position on the left side, to the umbilicus or any part of the abdomen, frequently to a spot above the right nipple, but never in my own experience to the right shoulder. That it does occasionally attack the right shoulder and elsewhere I have no reason to doubt, but cannot remember that I have ever heard a patient complain of it having radiated to the thigh or to the tips of the fingers.

The point, then, on which I insist as being of great importance in diagnosis is this: that when biliary colic is due to the passage of gall-stones the pain begins in the back, and not, as in other affections of the bladder and ducts, in the right hypochondrium. Dr. Kraus of Carlsbad, who has had large experience in the treatment of gall-stones and himself suffered from the disease, in a short treatise published a few years ago, also insists on this point. The only difference between his experience and mine is, that the pain in the back which Dr. Kraus suffered though exactly in the same

position as above-mentioned was of longer duration. The duration might depend on the length of time required for the stone to enter and traverse the cystic duct. For example, a medical man was operated on two years ago by Kehr, who found a stone rather larger than a pigeon's egg lying in the neck of the cystic duct. This medical man, who made notes of his own case, states that the pain usually began in the back. That it did not always begin in the back is readily explained by the fact that the attacks were sometimes due to the stone trying to find its way into the duct, at other times to distension of the gall-bladder caused by the obstruction of a stone of large size.

Doubtless, however, so great is the influence of phrases recurring in our text-books, the pain of biliary colic will still continue to be looked for only in the region of the gall-bladder, and the first stages of this disease, when treatment is of so much importance, will be overlooked or mistaken. I have known a patient treated for some months by an intelligent medical man for some spinal mischief, whose acute sufferings from gall-stones in after years an earlier diagnosis would probably have done a good deal to prevent.

Though I have repeatedly and closely observed the sensations at the beginning, during the course and at the end of biliary colic followed by the passage of stones, I regret that I have never been able to determine, from the position and character of the pain, whether the stone lay in the cystic, hepatic or common duct. Nor can I find anywhere more than a few vague guesses that, if followed out, might lead to a solution of this question. Were this question solved, its solution would in some cases prove to be of considerable value as a guide to medical and surgical treatment.

One point only I have observed: that sometimes during the last minute or two of an attack, when the pain suddenly

ceases, and presumably the stone enters the duodenum, there is a peculiar gliding sensation a little to the right of the tenth to twelfth dorsal vertebræ.

There is a current impression that while the passage of even small stones through narrow ducts may cause excruciating pain, a large stone can be got rid of without much suffering. Doubtless there have been cases where little or no pain has been experienced for a considerable time before a large stone was evacuated from the bowels. One can readily understand how even a large stone can pass through a dilated duct without causing much pain; but if inquiry be made into the patient's condition previous to the weeks or months during which the stone may have been lodged in the bowels, or the ducts become distended, I do not think it will be found that there are many who have passed stones through the ducts who have not at some time or other had a good deal of suffering. The amount of pain caused by stones which do not pass through the ducts, but make their way through the inflammatory tissue, probably depends for the most part on the acuteness of the peritonitis with which this abnormal migration is accompanied. The modes of transit through irregular channels and of the formation of fistulæ are so many and varied, that though we might surmise that something of the kind is taking place, I know nothing either in the character or seat of pain that would enable us absolutely to affirm it.

When biliary colic is due to a stone entering or traversing narrow ducts the pain begins suddenly. The patient may be sleeping soundly, or laughing or talking in happy forgetfulness of all aches and pains; in less than two minutes he is groaning in agony. The greater number of these attacks begin in the night. Kraus found in the course of one year's practice that he was called sixteen times in the day and sixty-two times in the night to relieve patients suffering

from acute biliary colic. As already said, we attribute the prevalence during the night to the fact that the gall-bladder becomes distended with bile when there is a long interval between meals. The attack may last only a few minutes, and terminate in profuse vomiting. Unhappily, this is rarely the case. With occasional slight intervals due to the entrance of a stone into a wider part of the ducts the attacks generally last from four to twelve hours. Some speak of pain of this kind continuing for days. I have no experience of it, never myself having allowed a longer time to pass, nor a patient to suffer, without giving chloroform or morphia. I am rather inclined to believe that the pain which continues for days is due to an inflamed or distended gall-bladder, and not to the passage of stones. When a stone becomes impacted in the duct, and jaundice supervenes, there are aches and pains somewhat of a dragging character, but there is not often a continuance of the acute agony which is experienced during its direct passage.

It is by no means easy to describe the pain of an acute attack of biliary colic due to the passage of a gall-stone. Of all the pains which mortal man can suffer this is probably the most severe; women, who have borne children, have told me that the pain of childbirth is by no means so severe as that of gall-stones. A few cases have been reported where death could be attributed to nothing else than the severity of the pain. The patient lies still for a few moments, then turns on his side, then gets on his knees, throws himself on a sofa, or rolls about on the floor. There is no particular position in which for more than a moment ease can be obtained. Contrary to what one might expect, there is little or no straining of the abdominal muscles. It is not by the straining of the abdominal muscles that stones are expelled. The strongest man is reduced to such weakness

that he is compelled to groan. The groan is characteristic. Those who have been accustomed to hear it could tell, I should think, without seeing the patient, the disease from which he suffered. I have several times, while free from pain, attempted to imitate that groan, but never succeeded in deceiving the members of my household. As everyone who has suffered knows, a quiet spot away from where one is likely to be heard gives some measure of relief when one has to undergo the excruciating agony and torture of this disease.

When a medical man is called to a patient suffering from acute biliary colic the agony may be so great, and the pain shooting in so many directions, that it is by no means easy to discover from what point it proceeds. I found from personal experience that there is an easy method of solving the difficulty, and one very agreeable to the patient, but I have not heard it mentioned nor seen it referred to in books. Give a whiff of chloroform, not enough to produce unconsciousness, and the distant or referred pains disappear, their mode of disappearance being very interesting to anyone cool enough to observe it, and there remains only a subdued pain in the region of the right hypochondrium, a spot so small that one could cover it with the tips of one or two fingers. Though this method of diagnosis is one not generally resorted to in this or other diseases, I find it is well known to some if not all anæsthetists, and is familiar to those who have inhaled chloroform to relieve the pain in the temple arising from a carious tooth or sciatica when the pressure is on some particular part of the nerve.

(*b*) There is the pain arising from a local peritonitis associated with an inflamed or distended and contracting gall-bladder. The pain of acute biliary colic, due to the passage of gall-stones begins, as we have said, in the back. It begins suddenly, and there is a moment when it as suddenly

ceases, and the patient who had been writhing in agony looks up and says, 'I'm all right.' Pain arising from an inflamed or distended gall-bladder rarely begins in the back, nor is its beginning or ending comprised in a moment of time. It is generally felt in the region of the gall-bladder, and is seldom so severe as that caused by the passage of a stone. Pain due to inflammation may begin in a moment, but there is not one particular moment when the pain suddenly ceases and the patient affirms with a sigh of relief that it has entirely gone. The stab of pleurisy may be felt in a moment, but there is no particular moment at which it can be said that it has entirely disappeared. Besides, in pleurisy the inflammation of the pleura is direct, whereas the local peritonitis referred to is secondary to an inflamed and infected gall-bladder. In a word, the pain caused by the entrance and passage of a stone through the ducts differs in many ways from that caused by inflammation. It is limited to a definite period of time, whereas the pain in inflammation is continuous.

In the early stages of gall-stones these two kinds of pain and their cause may be readily distinguished. In later stages, when the gall-bladder may be distended or its contents purulent, and a stone at the same time is passing the ducts, there may be, and probably is, often confusion. This does not detract from the fact that there are two different kinds of pain arising from two different causes, and that in certain stages of the disease they ought to be readily distinguished.

(*c*) There is a third order of pain differing entirely in position, in duration and cause from those we have just mentioned. There are many like myself who have probably in past times been puzzled to account for a pain in the left hypochondrium below the cartilage of the eighth, ninth and tenth ribs, and have referred it in some vague way to some disorder of the stomach. To Mayo Robson we are chiefly

indebted for pointing out and insisting on the origin of this pain. I have gone into the history of a considerable number who have pain and tenderness in that position, and have always found that some months or years previous to their having experienced this pain they had suffered from attacks of biliary colic, and generally there has been an unmistakable history of gall-stones. This pain is doubtless due, as surgeons have found out, to adhesions in the neighbourhood of the gall-bladder. If the adhesions be comparatively recent, and sometimes even years after an attack of biliary colic, pressure over the left hypochondrium will elicit pain in the region of the gall-bladder.

2. **Tenderness.**—Not only during attacks of biliary colic, but in the interval between attacks, tenderness is a well-marked and most important symptom of gall-stones. As already said, gall-stones are almost always associated with localized peritonitis, and to this the tenderness is probably for the most part due.

Though this tenderness be more or less widely diffused, its centre is always below the ninth costal cartilage, or, to put it more precisely, in a line between the ninth costal cartilage and the umbilicus, but nearer the cartilage than the umbilicus. It may be further localized by a line drawn 1 to 2 inches inside the right nipple to a point a little below the cartilages. Apart from the passage of stones or unmistakable distension of the gall-bladder, there is no symptom that points more clearly to some affection of the gall-bladder or bile-ducts than tenderness at this point. I do not say that this tenderness is never found apart from gall-stones or an inflamed gall-bladder. I have observed it in mild catarrh of the bile-ducts, probably so far causing obstruction as to induce stronger contractions of the gall-bladder, when there was no reason to admit anything more than the possibility of stones. When, however, this tenderness is

found associated with severe attacks of pain in the region of the gall-bladder, there need not be the slightest hesitation in attributing it to stones or an inflamed gall-bladder.

3. **The Evacuation of Biliary Calculi.**—There can, of course, be no more certain proof of the existence of stones than their being found in the motions. The addition of eucalyptus or carbolic acid makes the search less disagreeable, and a few ounces of formalin in a 1 or 2 per cent. solution render the motions practically odourless. This duty must not be devolved on a nurse or skilled attendant. Pips or skins of fruit, husks of oats, bits of fat or soapy material are readily mistaken for gall-stones, and the stones, being of so varied size, colour and consistence, can readily be overlooked. When the motion is passed into a sieve and there is an abundant supply of water, a few minutes will, however, determine whether they are present or not.

One seldom looks for gall-stones, even when there is an impression that the patient is suffering from them; but a failure to find them after an attack of colic, even after careful search, by no means proves that they have not passed through the ducts, as sometimes they remain for weeks or even months in the intestine.

When there is any doubt as to the nature of the disease, it is certainly a source of satisfaction to the medical man to produce some of the stones to his patient. The pain, the tenderness and other symptoms are, however, generally so well marked that there can be no doubt as to the diagnosis, though no stones are discovered.

4. **Jaundice.**—Though the impression, as we have already pointed out, be not uncommon, even among medical men, that when there is no jaundice there can be no gall-stones, that impression is formed without calling to mind the anatomical relations of the gall-bladder and bile-ducts. It is true that in almost all who suffer from gall-stones, one may observe

a slight yellowness of the conjunctivæ, but there is by no means always well-marked jaundice. The bladder may have been packed with stones, numerous stones may have been passed, there may be stones in the cystic duct, but when there is no obstruction nor pressure on the common duct, there is not necessarily jaundice, and even when there are stones impacted in the common duct, they may be of so irregular shape as to allow the passage of bile.

In the diagnosis of gall-stones, jaundice as a symptom is almost valueless. In the vast majority of cases their existence ought to be diagnosed long before the advent of jaundice; further, jaundice arises from so many different causes inside and outside the liver that many diseases must be excluded before we can say, apart from other symptoms, that the jaundice is the result of stones.

5. **Fever.**—It is often said that the passage of stones is accompanied with a rise of temperature. I have not found this to be the case, nor do I know any reason why there should be. Increased temperature after the passage of a catheter was at one time referred to nervous irritation; it is now referred to a septic catheter or inflammation of the bladder or urethra. To the same cause I think we may also safely refer increased temperature during the passage of gall-stones, namely to inflammation or the presence of microbes in the gall-bladder or bile-ducts. There may be and often is shivering, but I have not observed high temperature. When, however, a stone remains a considerable time impacted in the ducts, there is almost always a rise of temperature. This we can readily understand when we consider that at the same time bladder and ducts seldom escape being invaded by septic organisms or pus.

6. **Vomiting.**—Almost all who have suffered from frequent attacks of biliary colic have found these attacks accompanied at times with vomiting. A dignitary of the English Church,

who often tells me of his experiences when some years ago he suffered severely from gall-stones, mentions the pain, but seems to have a livelier recollection of the havoc produced among his books and manuscripts by the sudden and profuse vomiting which on almost every occasion ushered in an attack of biliary colic. Vomiting so profuse or so frequent is, however, by no means common.

7. **Disordered Appetite.**—Unless when the patient is worn out with pain or sleeplessness, the appetite as a rule is not diminished; on the contrary, it is sometimes voracious. I have been compelled on some occasions to leave bed during the night and search for food in kitchen or sideboard, leaving off after devouring any amount of miscellaneous material not because the desire for food was satisfied, but from dread of the consequences. The consequence always was that I returned to bed, had a sound sleep, and awoke quite ready for breakfast.

8. **General Bodily Condition.**—When the attacks are frequent, there is generally, but not always, loss of flesh, and especially when there has been prolonged jaundice, the patient may be terribly emaciated. The loss of flesh may be due to the pain and nervous depression, partly also to interference with meals, but apart from jaundice or high temperature, I do not think it otherwise results directly from gall-stones.

Differential Diagnosis.

It is not our purpose to enumerate all the diseases whose symptoms at times have a close resemblance to those of gall-stones. Suffice it to refer to a few that are familiar in everyday practice.

1. **Cramp of the Stomach.**—I cannot precisely say what this disease or symptom really is. It is an expression frequently used to conceal our ignorance of the real cause

of the disorder. Nervous dyspepsia is another term often similarly employed. Suffice it to say that when there are severe attacks of pain in the right hypochondrium, and tenderness below the ninth costal cartilage, the cause is not cramp of the stomach, but gall-stones. As the early diagnosis of gall-stones is of the utmost importance, it is heartily to be desired that this fact were more fully and universally recognised.

2. **Gastric Ulcer.**—It is by no means always easy to distinguish between gall-stones and gastric ulcer. Besides, it is not uncommon for both diseases to co-exist, or for gall-stones gradually and insensibly to follow gastric ulcer. I had recently a patient under my care who unmistakably suffered from ulceration of the stomach, and after the gastric symptoms had subsided, there was as unmistakably biliary colic due to gall-stones.

The following may serve in most cases to draw the line of demarcation: (*a*) The pain in gastric ulcer is practically always in the centre of the epigastrium, and, as has been often shown, the seat of this pain and tenderness does not depend on the position of the ulcer. In gall-stone colic the centre of pain and tenderness is, as we have repeatedly said, in the right hypochondrium. (*b*) Pain in gastric ulcer generally begins after food, and is seldom experienced at night or after one has been some time in a recumbent position. Biliary colic occurs more frequently during the night, and some hours after food has been taken. (*c*) While biliary colic is not dependent on the kind of food taken, the pain of gastric ulcer, as is well-known, is felt generally after a solid meal. I cannot find that an analysis of the stomach acids serves much purpose in determining between these diseases.

3. **Appendicitis.**—Here, too, at the onset, to distinguish between these diseases is often difficult. In both the

pain may be so severe, and the tenderness so diffused, that it is scarce possible to distinguish between the pain below the ninth cartilage, which is diagnostic of gall-stones, and McBurney's point, the point halfway between the umbilicus and the anterior superior spine of the right ilium, which is diagnostic of appendicitis. Though the after history may make the distinction quite clear, for early diagnosis a whiff of chloroform given in the manner already described often proves most valuable.

4. **Wandering Kidney.**—A wandering kidney is most readily distinguished from a distended gall-bladder by its shape, its mobility, and the peculiar feeling of nausea produced by pressure. Here, as in other diseases, information is sometimes gained by distending the stomach or bowels with air. To distinguish between an abscess in the neighbourhood of the kidney and an enlarged and purulent gall-bladder is, however, often difficult.

5. **Ovarian Cysts and Other Growths.**—At first sight it might appear there need be no great difficulty in distinguishing between a distended gall-bladder, an enlarged liver, an ovarian cyst, or a cystic kidney. In actual practice the difficulty is often considerable. A distended gall-bladder is of variable form, and occupies different positions; it may be round like an orange, or shaped like a cucumber. It would occupy too much space to enter into particulars as to how these various diseases are distinguished. Take the apparently simple problem of determining whether increased dulness in the right hypochondrium is due to an enlarged liver or a distended gall-bladder. If the gall-bladder be fixed by old adhesions, a mistake may readily occur; and when one reads of a liver markedly increasing in size before, and diminishing after the passage of a stone, one cannot help, with all respect to so distinguished a diagnostician as Naunyn, regarding it as more probable that the increase

and diminution in dulness is due to the altered dimensions of the gall-bladder. In one patient whom I examined carefully and had no doubt that the increased dulness was due to an enlarged liver, I found, on examination six months afterwards, when various changes had taken place, that the increased dulness had been due without any manner of doubt not to an enlarged liver, but to a distended gall-bladder. In these cases, it is always safer to make careful percussion over the posterior as well as the anterior aspect of the liver.

6. **Pancreatic Cysts, Calculi, etc.**—To distinguish between affections of the pancreas and those of the gall-bladder and bile-ducts is extremely difficult, and the discussion of the question would occupy too much space. Those who are interested can readily refer to the *British Medical Journal*, December 22, 1900, which contains an address by Barling, in which the subject is ably and tersely discussed. As Barling puts it, there are two reasons why diseases of the pancreas are not yet well understood: first, the pancreas is not easily examined in the living subject; and, secondly, the examination of the organ post-mortem is often most perfunctory.

There is no disease of the pancreas, be it malignant, cystic, infective, inflammatory, or calculi, which may not readily be mistaken for corresponding disease of the gall-bladder or bile-ducts. When we remember that the pancreatic and common bile-ducts are closely embraced by the head of the pancreas, and have a common opening into the duodenum, it is readily understood how calculi or infection may be found in both, and how the symptoms of a stone passing through the pancreatic duct may closely resemble those of a stone passing through the bile-duct. Happily—at least, so far as has been observed—pancreatic calculi are rare, and owing to the feebler muscular power of

the pancreatic duct, the pain caused by a stone passing through that duct may not be so severe as that caused by a stone passing through the bile-duct. As Barling has pointed out, surgeons sometimes cut down on the gall-bladder when the disease is in the pancreas, and disease remaining overlooked in the pancreas may possibly account for some of the failures of gall-bladder surgery. Pain due to pancreatic disease is said to be felt midway between the umbilicus and the xiphoid cartilage, or below the left costal arch. This indication has not yet, however, proved sufficient to prevent mistakes in diagnosis.

7. **Cancer.**—As already said, gall-stones are undoubtedly in some cases the origin of cancer. This does not necessarily imply that cancer originating from gall-stones is always preceded by attacks of biliary colic. In a considerable proportion of those who have gall-stones there never has been biliary colic, and yet the irritation produced by their presence may suffice to cause malignant disease. In such cases cancer reveals its presence not so much by pain as by the growth in the neighbourhood of the gall-bladder, by the deepening jaundice, ascites and gradual wasting.

To distinguish between malignant disease and a stone blocking the duct is not always easy, and yet it is a distinction often extremely desirable to make, both as regards prognosis and medical or surgical treatment. In order to make this distinction the following points deserve attention:

(*a*) *The Presence of a Tumour or Growth.*—The tumour may be so large and hard that, with the aid of other symptoms, there is no difficulty in diagnosing cancer. In other cases the enlargement may be so ill-defined that it is scarce possible to say whether it is due to a neoplasm or to peritoneal thickening and matting round inflamed bladder and bile-ducts. Mayo Robson has said that an enlargement

of the gall-bladder with jaundice is strongly suggestive of malignant disease, as prolonged irritation from gall-stones leads generally not to enlargement, but to contraction of the gall-bladder. In our experience, however, it is not often easy, when the patient suffers from malignant disease, to say whether the gall-bladder is enlarged or contracted.

(*b*) *Pain.*—A gradually deepening jaundice and increased dulness in the neighbourhood of the gall-bladder, with little or no pain, is almost pathognomic of cancer; pain being almost entirely absent in possibly 30 or 40 per cent. of those who suffer from cancer. Before a stone has become impacted in the ducts, there have been in almost all cases repeated attacks of biliary colic.

(*c*) *Jaundice.*—When the jaundice gradually deepens without attacks of pain, there is generally cancer; when the jaundice is intermittent, and is most marked after an attack of biliary colic, it is most probably due to an impacted stone. It is to be remembered, however, that cancer is generally associated with catarrh of the ducts, and the disappearance of catarrhal débris from the ducts during cancer and the consequent remission of jaundice may readily lead to a mistaken diagnosis.

(*d*) *Fever.*—The attempt to distinguish between cancer and an impacted stone by temperature has signally failed. It is true that there is generally more or less fever with impacted stones, but this has been shown to be also the case in cancer, even when the disease is in the form of a hard growth with little or no pus or breaking down of the hepatic nodules.

Although when taken singly not one of these points is diagnostic of cancer, yet when taken together in the great majority of cases there need be no reasonable doubt. For my own part, I prefer to give the patient as long as possible the advantage of any doubt. I remember a patient under

my care who had been seen by several medical men, and one of them, a distinguised diagnostician, gave an absolute diagnosis of cancer. In a few months after, the patient was going about, and to my knowledge for years after was in robust health.

8. **Lead Colic.**—Surgeons state that patients are occasionally sent to them for operation who are suffering not from gall-stones but lead-poisoning. It is to be remembered, however, that a blue line on the gums does not necessarily indicate that the colic from which the patient suffers is due to lead. I have had occasion to observe that a large proportion of those employed in a white lead factory, where the arrangements were defective, had a blue line on the gums, but only a few had other definite symptoms of lead poisoning. When a worker in lead with a blue line on the gums suffers from colic, it is evident therefore that further inquiry must be made before the colic is attributed to lead.

Methods of Diagnosis.

Before leaving this subject, it may be well that we add a few remarks on the methods of examination.

First of all, attention should be given to the general appearance. A careful observation of the physiognomy sometimes enables an unskilled person to make a more correct diagnosis than the skilled physician. To distinguish between malignant disease and suppuration of the gall-bladder, or chronic obstruction of the ducts, is of great importance as regards prognosis and treatment. Medical men and surgeons are often in doubt, and after every effort to make out the distinction, their diagnosis is afterwards proved to be wrong.

Kehr tells us he had an attendant who not only announced the name of the patient but the nature of his disease, and

practically never made any mistake in informing him whether or not it was malignant.

Before referring to the principal modes of examination, there is one which must be mentioned, and which cannot be too strongly condemned. One is surprised to find that even Naunyn was in the habit of exploring the gall-bladder with a hypodermic syringe. If exploration must be made, it were surely more reasonable to cut down at once into the gall-bladder rather than incur the risk of its purulent contents exuding into the peritoneum. The objection is not theoretical. It rests on the disastrous results that have now and again followed exploration with a hypodermic needle.

From inspection and auscultation we can learn little. In thin people inspection may show a bulging in the right hypochondrium, and even what might appear to be a distended gall-bladder. By auscultation and shaking some have said they have heard the rattle of stones. I have never heard it, and before accepting the statement shall be content to wait till I do hear it.

The principal methods of examination are palpation and percussion. Percussion is of practically no value apart from palpation. By percussion we mark out an area of dulness, but we have to determine afterwards by palpation whether this dulness is due to an enlarged liver, a distended gall-bladder, a malignant growth, a mass of adhesions, or merely to that tongue-like projection of the liver over the gall-bladder which is so frequently found in those who have long suffered from gall-stones. Granted, even, that we have satisfied ourselves that the increased dulness is due to the greater space occupied by the liver, there are many other points still to be determined—*e.g.*, whether this enlargement or change of shape is caused by disease or the constriction of corsets.

In the great majority of cases palpation explains what remains undetermined after percussion. The value of pal-

pation depends, however, entirely on the manner in which it is carried out. It is almost needless to say that if a cold hand be applied to the abdomen the muscles so rapidly contract, and the patient is so upset that examination must generally be deferred till another occasion. Nor do we obtain any better result if pressure is at once made or the tips of the fingers thrust into the area of tenderness. First of all, the patient must lie down in a recumbent position, the knees being drawn up, and the head resting on a low pillow or cushion. When the attention has been distracted examination is begun by laying the surface of the hand over those parts of the abdomen that are farthest distant from the gall-bladder. Gradually we approach the gall-bladder, and after making out the amount and area of tenderness, the tips of the fingers are thrust deeply into the region below the ribs. In this way we can make out how far the liver extends downward, and the thickness and contour of its border. We may also be able to make out the existence of a tumour, or a distended gall-bladder, but we shall probably fail to discover anything as to the gall-bladder if much contracted or embedded in a mass of adhesions.

While palpation is useful when conducted in this manner, no examination can be regarded as complete which is not bimanual. I have never been able to elicit much information by laying one hand over the gall-bladder and the other over the right lumbar region. Far better is it that the patient turn over somewhat on the left side, and with the one hand over the region of the gall-bladder, and the other pressing on the left lateral lumbar region, we can then often make out the form and size of the gall-bladder, determine whether it is lax or acutely distended with fluid, and discover points of tenderness that could not possibly be made out by the ordinary method of palpation. It might seem out of place to refer to these particulars, which are doubtless

familiar to most medical men, yet we cannot fail to observe that the neglect of these simple methods often leads to an imperfect or mistaken diagnosis.

The Röntgen rays have not as yet added much to our knowledge of the pathology of gall-bladder or bile-ducts. Carl Beck has reproduced some interesting skiagrams of gall-stones, and discussed the subject in the *Berliner Klinische Wochenschrift* of May 13, 1901. From what is there stated it might appear that this method of diagnosis may yet prove to be of some value in a certain proportion of cases.

Microscopical examination of the blood may aid in determining whether a patient is suffering from malignant disease or some non-malignant but severe affection of the gall-bladder, and a closer attention to this method would doubtless be rewarded by important results.

From what has been said in this chapter, I think it will be admitted there need be no great difficulty in the great majority of cases in diagnosing gall-stones in their earliest stages, and that in later stages it is almost always possible to distinguish between a stone impacted in a bile-duct, an enlarged or purulent gall-bladder, gastric ulcer, and malignant disease.

CHAPTER V

TREATMENT

So much attention has been directed during recent years to the treatment of gall-stones by operation that medical treatment has been almost entirely ignored. I do not think I am wrong when I say that in the mind even of the majority of medical men all treatment may be summed up in a few words—namely, relieve the pain, give olive-oil, or any other supposed remedy, but expect nothing from it, and, if the symptoms are urgent, advise operation. Frankly, I confess I was formerly of the same opinion, and even now I have no infallible remedy to propose. So far, however, from regarding medical treatment as useless, I am firmly convinced that if a correct diagnosis be made in the earlier stages, and suitable treatment adopted, the question of operation will almost never arise, and that even in later stages, when there are serious complications, the medical man can, in the great majority of cases, do more for the patient than the surgeon. I speak from personal experience, and make no apology for obtruding that personal experience. Frequently recurring and agonizing attacks of biliary colic compelled me to look for a remedy. The only remedy seemed to be operation. I now plainly perceive that, had I thought less about operation and placed confidence in simpler and less dangerous remedies, I would have

been saved much suffering, loss of time, and needless anxiety.

There is, however, as we have said, no infallible remedy. When I first thought of giving to others the benefit of my experience, I asked a leading surgeon if he thought it advisable that I should do so. The reply was that I ought to do so by all means, if I knew an infallible remedy. Of infallible remedies I know nothing, except that I have read of them in the pages of newspapers, and, I regret to say, mostly in religious journals. If, as this surgeon implied, operation is to be regarded as likely to prove an infallible remedy, I differ from him, and regard his conclusions as neither warranted by facts nor by the pathology of the disease. So far from operation having proved to be an infallible remedy, when we turn to the death-rate in England during the past twenty years, we do not find that operation has done anything to lessen the mortality from this disease.

In our introduction we referred to the fact that in 1879, before the advent of gall-bladder surgery, the number of deaths attributed to gall-stones in England was 172, and there has been a gradual increase till 1899, when the number of deaths attributed to this cause was 488. The rate of increase has been most marked during the recent years, which may be regarded as the era of gall-bladder surgery. This increase of mortality may be due in some measure to more exact diagnosis. It may also be accounted for to some extent by the mortality following operation. Be this as it may, I am convinced that it is undoubtedly largely due to the fact that, owing to the frequency with which operation is undertaken, gall-stones are now regarded as a more serious disease than formerly. When a patient has an attack of biliary colic, and the disease is pronounced to be gall-stones, he lives under constant dread of operation,

and the depression thus produced, by interfering with the functions of the liver, tends to convert what may be a very simple into a serious malady. As already said, the great majority of those who have gall-stones are never cognizant of them, and of those who suffered but few succumbed in the days when patients were not harassed by the thought of operation, and were under the care of medical men who regarded the disease as less serious, who exercised their individual judgment, did not follow the trend of the surgeon and regard all treatment but operation as useless.

But, further, when we consider the nature of the disease, there is nothing to lead us to expect that operation, however improved or perfected, will ever prove an infallible remedy. The main purpose of the surgeon is to remove gall-stones; but can he claim that when he has removed the gall-stones he has got rid of the cause that produced them? Granted that he removes the stones, is there any guarantee that others will not be formed? Even when at considerable risk to the patient (the mortality in the hands of so accomplished a surgeon as Mayo Robson is 16·6 per cent.) he removes the gall-bladder, is there any guarantee that stones will not form in the ducts? As a matter of fact they do, and other complications ensue as a result of operation. For this reason Kehr advises his patients not to return home and resume their occupation immediately after operation, but to go for a time to Carlsbad. It is true that there is a gradually lessening mortality from operation, but it would be unreasonable to expect that a time will ever arrive when it can be undertaken without risk, or to imagine that, beyond removing the gall-bladder and hepatic drainage, anything more radical can ever be accomplished by surgery.

I claim for the medical man that he can do far more in the treatment of this disease than the surgeon. In this concluding chapter we have to consider therefore what the

medical man proposes to accomplish by treatment, and how far he is likely to succeed in accomplishing it.

First of all, be it distinctly understood that it is not the purpose of the medical man by massage, electricity or other means to remove gall-stones. It is quite true that gall-stones are sometimes removed by manipulation. Cases are on record where, after much manipulation for the purpose of diagnosis, gall-stones were passed, and the patient made a rapid recovery. Granted, however, that this could in more than a very small percentage be accomplished, the risk is too great. Stones which have been resting quietly in the gall-bladder may be forced to migrate, and become impacted in the ducts. Inflammation of the gall-bladder which may be slight may through much manipulation become severe, and dangerous consequences follow. Methods of this sort will doubtless continue to be exercised by the quack, but it is scarcely to be expected that they will be resorted to by any medical man who is acquainted with the pathology of the disease.

Nor do we regard it as the main object of treatment to dissolve the stones. There is no reason to despair that it may not be some day found possible by diet and drugs so to alter the constituents of bile that stones may be dissolved; meantime, however, it is well to remember that there is a world-wide difference between dissolving stones in a test-tube, and so altering the constituents of bile that they can be dissolved when lying in the gall-bladder or bile-ducts. To this we shall more particularly refer when discussing the action of olive-oil as a solvent.

If the premises on which we have proceeded be correct, we find in them, rather than in the methods just mentioned, the basis of the rational therapeutics of this disease. We have seen that there are certain irritant materials developed during the stagnation of bile, or derived from the abnormal

products of digestion, which cause inflammation of the lining membrane of the gall-bladder and bile-ducts; that it is this inflammation together with the entrance of typhoid and other organisms that lead to the excretion of cholesterin and other materials which constitute gall-stones; that it is this inflammation which leads not only to the formation but the migration of stones, jaundice, perforation, impaction in the ducts and other consequences of that migration; that the inflammation caused by the irritating properties of bile, while leading in many cases to the formation of stones, is also not infrequently the cause of those changes in bladder and ducts which are often associated with, but are also found entirely apart from, the formation of stones. From these premises, then, it is evident that it is not gall-stones in themselves that constitute the disease, but the inflammatory conditions from which they originate, and with which they are often found associated. Some of the ablest surgeons have even admitted that, if all inflammation is subdued and the stones kept at rest, the patient is as effectually cured as though the stones themselves had been removed. With this we entirely agree, but further contend that the cure which is brought about by the removal of inflammation and setting at rest the stones is not only as effectual but more radical than anything that is ever likely to be accomplished by gall-bladder surgery. In other words, granted a sufficient supply of pure bile and no gall-stones are formed. Provided that through impure bile they have been formed, the restoration of the bile to its normal quantity and condition will prevent their migration and clear out the pus, mucus, and other débris that are found to be so fruitful a source of disease when obstructing the ducts. This is no mere theory, but has been abundantly proved by experiment, and is an unmistakable clinical result in ordinary practice.

How, then, is this supply of pure bile to be obtained?

In order to answer this question it will be necessary again to refer, in a word, to what has been said as to the causes that lead to the stagnation and deterioration of bile. Stagnation of bile is caused by dress, pregnancy, wandering kidneys, growths, and other diseases, and deterioration of bile is produced by worry and the passage of abnormal products from the intestines. First, then, we must remove all causes that produce stagnation and deterioration of bile, and, secondly, by diet, drugs and hygienic measures, an abundant supply of healthy bile must be promoted.

1. First we must remove all causes that lead to stagnation or deterioration of bile. Some of these are to a certain extent inevitable. If the race is to survive there must be pregnant women, and so long as there is pregnancy there will be gall-stones. But granted that gall-stones are thus formed, if proper treatment be adopted, there is no reason why they should not be set at rest or practically ever prove a source of trouble.

There are other causes which can by no means be regarded as inevitable. Beyond the tyranny of custom and fashion there is no reason why the upper part of the abdomen should be constricted by corsets and other articles of dress. In China considerable progress is being made in doing away with the cruel and detestable practice of contracting the feet. It is a characteristic of the present age that no effort is spared to remove every source of disease. How comes it, then, that nothing is done in this country to get rid of a custom which is as detrimental to health as the tight binding of feet among the yellow ladies of China?

Another fruitful cause of gall-stones is worry, and this, too, is to be sedulously avoided. The beneficial effect of residence in Carlsbad and other watering-places is probably largely due to the fact that the patient is removed from the

worry of business and domestic anxiety. When incurring the responsibility of a large practice, I suffered incessantly from attacks of biliary colic. I was at length compelled to abandon it and seek for a time entire rest. No sooner had I been freed from the worry and responsibility of practice than the attacks entirely disappeared, and I rapidly gained vigour and health in consequence. The sudden disappearance of these attacks may have possibly been due to other causes, but I have been so much impressed by this incident in my own personal experience that I now strongly urge patients to sacrifice for a time the pursuit of wealth or other more useful employment and seek a life entirely free from worry and responsibility.

To the patient who suffers from gall-stones, the worry caused by the constant reflection that some day or other he must undergo operation, is not the least. In a state of health one does not think much of operation, but when the liver is at fault, even small troubles are vastly magnified. It seems as difficult to get over a mole-hill as a mountain. Men and women naturally brave become incapacitated to face any crisis in life, and shrink from an ordeal which, in a sound state of health, they would not hesitate to encounter. But even when the patient is worn out by repeated attacks of biliary colic, and benumbed and stupefied by the long use of opiates, when operation is finally decided on he can face it calmly. It is the suspense that is so wearing, and the constant questioning whether in the interest of his family and the work he has to do in the world he ought to undergo an operation that is not devoid of serious risk. As Carlyle pregnantly put it, it was not the crowing of the cock that troubled him, but 'the waitin' till it crawed.'

2. But not only must every effort be made to prevent any obstruction to the free flow of bile, we must endeavour

to stimulate that flow and see to it that the bile excreted be non-irritating and of good quality.

The most powerful stimulant of bile is undoubtedly food. Frequent and hearty meals will do more to increase the flow of bile than drugs, mineral waters, or any of the numerous remedies, real or fanciful, that have been employed for that purpose. On this fact we cannot lay too great stress, as there is a prevailing impression among the laity and even some medical men that when there is anything wrong with the liver there must be great restrictions as to diet. The patient is to avoid meat, fat, late suppers, and I know not what else. The consequence is that there is a decreased flow of bile, and the bile excreted, instead of passing directly into the duodenum, finds its lodgment for the most part in the gall-bladder. It is a fact fully established that a few hours after food there is a free discharge of bile into the duodenum, but when there is a long interval between meals the bile is stored up for future use in the gall-bladder. I am convinced that the biliary colic that occurs so frequently during the night might be prevented by a late supper, or even by food taken during the night, if sleepless, and the appetite demands it. This treatment applies to the earlier stages of gall-stones. In later stages, when there may be obstruction at the pylorus or dilatation of the stomach, this injunction does not necessarily apply. Treatment must in such cases be regulated by the condition of the stomach, as a mode of dieting which is beneficial in one condition may be hurtful in another. These latter cases, however, are the exception, and the fact remains, which we strongly insist on, that in the early stages of gall-stones the patient ought to have frequent and hearty meals.

A German writer has recently said that no one who has a tendency to gall-stones should eat eggs or bread, as they

contain cholesterin. If every article of diet that contains cholesterin is to be excluded, the consequence will be death, not from disease, but starvation. In the present state of our knowledge restriction in articles of diet has no rational basis. The one thing of importance is that the diet be adapted to the ordinary requirements of the individual, and that it be well digested, as it is from the products of indigestion that the bile derives those irritating properties that lead to disease in the gall-bladder and bile-ducts.

In order to obtain a free flow of unirritating bile a more than average supply of fluid is strongly advisable. The pressure exerted by the liver is so small that even though a more than normal quantity of liquid might be conveyed to it by the portal vein, I do not suppose the extra quantity of fluid ingested has any appreciable effect in increasing the flow and liquefaction of bile. Water or other liquid I regard, however, as valuable in clearing out the abnormal or irritating products of digestion, which, when conveyed to the liver, lead to the manufacture of bile that irritates the gall-bladder and bile-ducts. This beneficial result can only ensue when liquids are rationally taken. Everyone knows that tea and other liquids taken in large quantity with meals, so that the food is bolted and not masticated, is one of the most frequent causes of indigestion. It is also well known that digestion is much slower when the stomach is abnormally distended with fluid, and the gastric juice too much diluted. To avoid indigestion, and at the same time to obtain a sufficient supply of liquid, I think it well that it be taken some hours after a meal, when the food has for the most part left the stomach, and sufficiently long before another meal, so that it can be absorbed before the ingestion of that meal, while a glass of water at bedtime and before or after rising, cannot be regarded as otherwise than highly beneficial.

Notwithstanding all theories to the contrary, I am so convinced as to the value of water, that, as it is difficult for the gall-stone patient to take sufficient fluid by the mouth without interfering with digestion, I have for some time past had recourse to rectal injections. The idea was obtained from an irregular practitioner, who charged two guineas for his advice, and demanded from his patients an oath of strictest secrecy. The reader of this book can have it for the few shillings it costs, without the addition of some absurd regulations as to diet. The patient clears out the bowels with a pint or more of warm water. After clearing out the bowels two quarts or more are injected, and retained as long as possible. The time required is about an hour once every two or three days, and I know several bilious subjects who have tried all manner of remedies, who affirm that they have derived more benefit from this simple procedure than from all the various and wonderful combinations of so-called cholagogues they have had prescribed.

The value of exercise in preventing the stagnation of bile is universally admitted. Its importance is so generally recognised, not only by medical men but the laity, that it is needless to discuss the *modus operandi* by which this is accomplished. The strength and environments of the individual must, of course, be considered. Riding, rowing, and cycling may be named as forms of exercise that seem well adapted to give work to the abdominal muscles, to raise abdominal tension and reduce the vaso-motor splanchnic paralysis.

Having thus briefly referred to the influence of food, water and exercise in promoting the flow of bile, we now come to a question of no less importance: Are there any drugs that can produce an increased flow of bile or materially alter its quality?

Before, however, proceeding to consider this question, we must, for the benefit of those who are perpetually declaiming the value of drugs, refer to the fact that, apart from all consideration of the cure of this disease, there is one respect in which the use of drugs is absolutely essential. As everyone knows, there are vast differences in sensitiveness and the capacity of enduring pain. Nowadays, when not only medical men but even the laity have come to know so much of the value of chloroform, morphia, cocaine, nitrous oxide, and the various aniline derivatives, there is the risk of losing the ancient virtue of hardy endurance. Be this as it may, there are few who can suffer the terrible agony of repeated attacks of biliary colic without resorting to some of those means of relief which modern science has provided. Nor can we say they are not fully justified in doing so, provided they do not fly for relief from every slight attack of pain and so become utterly effeminate, and provided, that by too frequent resort to relief from drugs they do not become enslaved to a tyranny so debasing that, unless in the case of those suffering from terribly painful and incurable disease, it is worse than death.

There are two drugs that stand out so prominently as the best for relieving the pain of biliary colic that all others such as chloral, phenacetin, belladonna, nitroglycerine, are scarce worthy of mention. These are chloroform and morphia. The inhalation of chloroform in quantity sufficient to soothe the pain but not produce unconsciousness has this advantage: that most of those who thus use it frequently sooner or later suffer from so much nausea that it is only a very few who become enslaved to its use. There are few medical men who would deny a patient suffering hours of terrible agony the luxury of a few whiffs of chloroform. When administered in this way by a medical man it is safe enough. The danger is in the case of medical men, chemists, nurses,

and others who administer it to themselves, and there are few of us who cannot recall some intimate friend who has succumbed to it. When taken on a little cotton wool at the bottom of a tumbler it seems safe enough, but somehow the tumbler is not always at hand or the amount obtained in this way is not regarded as sufficient.

For more lasting relief there is nothing equivalent to a hypodermic injection of morphia, or, preferably, morphia combined with atropine. The tabloid form is convenient enough, but I have always found a fresh solution to act more rapidly and to be more reliable. Tabloids slowly dissolved under the tongue, unless taken in vastly larger doses than hypodermically, do not give the same measure of relief, and are of course more liable to upset the digestion. When a patient is entrusted with a hypodermic syringe he may sleep soundly enough, but I do not think that there ought to be sound sleep for the medical man who has entrusted him with it. Apart from the danger to life, it is but too often that the patient becomes habituated to its use. I have known the struggle to break it off to be fearful in the case of a strong-minded man who had used the needle only for a week. I have known others who have used it for months, and carried their syringe for years, but who never felt tempted to use it unless the pain was very severe. Sooner or later, however, with few exceptions, the individual, who scorns the idea that he or she could ever become a slave to morphia, wakes up to find that its use has become indispensable. It is all very well to read De Quincey's 'Confessions of an Opium Eater,' where the sufferings, though severe, are surrounded with a halo of wondrous poetic visions. To the ordinary mortal the struggle is fearful. There are no poetic visions, but only the tearing and dragging and sinking at the pit of the stomach, the deadly faintness, the feeling of immediately impending dissolution

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and yet the desire to live. It is painful for me to recall, even at this distance of time, the terrible struggle I underwent before I abandoned the use of morphia, but for the sake of others I am impelled to it. I had borne pain under the repeated protests of those around me against subjecting myself to so much suffering, and had used it less probably than most who have suffered from this disease. As soon as I discovered I was becoming enslaved to it, I broke it off, and though it is years since I have taken morphia or other sedative in any form, the remembrance of that struggle to break it off, far worse than any attack of biliary colic, is so strongly with me that I willingly grant the surgeon that when a patient who suffers from gall-stones is in danger of becoming enslaved to morphia, the only remedy is operation, even though operation may not seem likely to be attended with more than temporary relief.

It is claimed for dionin and heroin that they are as efficacious in relieving pain as morphia, and that patients do not become habituated to their use. Of dionin and heroin I have no personal experience; I shall, therefore, quote Oscar Jennings, not because I agree with all he states as to the cure of the morphia habit, but because of what he has observed as the effect of the drugs just named. 'I would give a warning against the synthetic derivatives of morphia recently devised, dionin and particularly heroin, which is largely vaunted now as the treatment of the morphia habit *par excellence*. The craving following its use is infinitely more unmanageable than that of morphia, and in two cases treated by me recently the doses were rapidly increased and the patients became violent when it was attempted to suppress it' (*Lancet*, August 10, 1901).

We now return to the question, Are there any drugs that not only relieve the pain of biliary colic, but that can be regarded as an actual remedy for gall-stones? In other

words, are there any drugs that not only promote the flow but alter the quality of bile?

There are three methods by which the value of such drugs may be tested: by experiments on animals, by observation on patients with biliary fistulæ, and by clinical results. Experiments on animals, for reasons to which we need not refer, are often misleading. When anyone is fortunate enough to meet with a case of biliary fistula where the bile is discharged externally, it is certainly well that he take advantage of it. The result of the most careful observation of such cases is, however, also misleading. It has been repeatedly shown that a large quantity of the bile that passes through the bile-ducts into the duodenum lies there for a time and is again conveyed to the liver. In this as in other respects, the normal man differs greatly from the man with the biliary fistula whose bile is discharged externally and none of which is reconveyed to the liver, and our calculations as to the amount and quality of bile are vitiated in consequence.

Further, the amount of bile excreted under the influence of certain drugs differs considerably in the estimates of different observers. We need only refer to the researches of Prevost and Binet, Rosenberg, Lewaschew, Nissen, Rutherford, Noel Paton, etc. There are several points in which practically all agree—viz., that mercury and other drugs regarded as cholagogues do not act by increasing the secretion of bile, but for the most part rather diminish it, that turpentine and salicylic acid may increase the bile to a certain amount, and that though ox-bile does markedly increase the quantity of bile excreted, its flow is impeded by the higher specific gravity of the bile thus formed, and the administration of ox-bile is therefore injurious rather than otherwise.

In plain contradistinction to these experiments on animals,

and observations on patients with biliary fistulæ, we have certain facts in which practically all medical men agree—viz., that mercury, podophyllin, etc., are the best remedies for so-called biliousness in ordinary practice. Many drugs administered in everyday practice are of extremely doubtful therapeutic value, but I do not suppose that anyone will question the fact that calomel or gray powder, when given in suitable cases, has a remarkable effect in removing the symptoms of so-called biliousness and clearing up the conjunctivæ.

How comes it, then, that the results in actual practice differ so widely from those obtained by experiments on animals? This has been in some measure explained by Rutherford, who gave some of the best years of his life to the study of the subject. I trust I may be pardoned for going over ground familiar to every medical man and to many outside the profession, but in order to the elucidation of our subject it seems absolutely necessary that we should do so. The reasons given by Rutherford why mercury and other so-called cholagogues, which are not found to increase but rather to diminish the flow of bile in animals and patients with biliary fistulæ, are nevertheless found to be so remarkably valuable in ordinary practice, are briefly as follows. The drugs referred to may act beneficially by (*a*) stimulating the cells of the liver or secreting apparatus; (*b*) by stimulating the muscular fibres of the gall-bladder and bile-ducts or excreting apparatus; (*c*) by removing the catarrhal or congested state of the orifice of the common bile-ducts or even to some extent of the larger bile-ducts; (*d*) by removing from the intestines substances which had been passing into the portal vein and depressing the action of the liver cells; (*e*) by stimulating the intestinal glands which drain the portal system. To these Hunter has added (*f*) 'the stimulation not merely of the intestinal glands but

of the whole mass of lymph cells in the mucosa of the intestine, and the cells of the spleen, the action of which according to my observation is so important in determining both the character of the products carried forward to the liver and the constituents of the blood itself.'

So far as is known at present, it seems pretty evident that mercury and other cholagogues have no direct action on the cells of the liver, otherwise the flow of bile would be increased in animals which have been the subject of experiments, and in patients with biliary fistulæ. In connection with this we may recall the fact that podophyllin and similar drugs when given in excessive doses markedly lessen the flow of bile and increase the symptoms they are given to alleviate. It seems very improbable that mercury could have any effect on the muscular tissue of the gall-bladder or bile ducts. We are forced, then, to the conclusion that the beneficial action of these drugs is due to the removal of badly digested products from the intestines and in producing certain changes in their power of absorption. And this brings us back to what we have been insisting on all through these pages, namely, that it is the conveyance of the abnormal products of digestion to the liver that leads to the excretion of a deteriorated bile that irritates the lining membrane of ducts and gall-bladder, causing an increase of cholesterin and the formation of stones. And it is precisely those materials which purify the bile, that have proved to be the best remedies not only in gall-stones but in practically all diseases connected with the liver.

For the promotion of healthy bile, let mercurials, saline, and other substances—notwithstanding the fact that they are not found to increase the quantity of bile excreted during experiments on animals—by all means be given. And let it not be said that because we have not commended any special drug we have no faith in medical treatment. We

cannot claim for any particular remedy that it is infallible, yet there is not one of the usual remedies that we would part with from what some surgeons have termed our mediæval armament of drugs. Each has its own special province—antacids and antiseptics to neutralize abnormal acids, to promote the flow of gastric juice, and to prevent spasmodic contraction of the pylorus; rhubarb or the old sulphur well at Harrogate to act on the duodenum; aloes, to act on the colon; and mercury, etc., to stimulate the intestinal glands, and prevent the development of noxious bacteria. In a word, grant the removal of irritating materials and the active absorption of the healthy products of digestion, and we obtain a flow of healthy bile that clears out the bile-ducts, relieves bladder and ducts of mucus, pus, and stagnant bile, restores their lining membrane to a healthy condition, and allows any calculi that may have formed to lie at rest, as they do in any case in the vast majority of those who live well-regulated lives, happily unconscious of those foreign bodies on which surgeons have made so vigorous an onslaught.

Turpentine and Ether.—Before leaving this subject we must refer to some remedies that are well known not only to medical men, but to those outside the profession. Almost everyone who has heard of gall-stones has also heard of the famous Durande remedy—turpentine and ether. Capsules containing 10 minims of turpentine and 15 minims of ether are easily swallowed, provided they are freshly prepared or composed of such ingredients as prevent hardening. It is difficult to find any reason that would explain how turpentine and ether could benefit anyone suffering from gall-stones. It is true that ether is an antispasmodic, and turpentine is one of the agents that have been supposed to increase the flow of bile. Neither the turpentine nor ether can, however, be credited, as

was originally supposed, with the power of dissolving gall-stones. Though one can find no reason to account for any beneficial action of this remedy, still we cannot shut our eyes to the fact that it is one from which not a few believe they have received much benefit. I know a lady who has taken this remedy with almost no intermission for the past ten years, and though it is now several years since she had an attack of biliary colic, she is firmly convinced that only by this means she has warded off further attacks. I have never seen any bad result from its long continuance, and I think I know a few who have been benefited by its use. We have already said that as regards treatment the digestive functions demand the first consideration, and provided the digestion and other functions are in good order, I know no reason why the patient should not have turpentine and ether if he wants it.

Olive-oil.—Olive-oil is held in still higher repute than turpentine and ether by some medical men, and not a few of the laity. There is no remedy which has not at some time or other been followed by the passage of stones. A medical friend of mine who lately entered on a new practice gained great reputation by giving a mixture that was followed by the passage of stones and the cessation of pain which his predecessor had only partially succeeded in relieving. The mixture was rhubarb and soda.

Olive-oil has been followed by the passage of stones, though doubtless it has gained some reputation by the soapy materials eliminated being sometimes mistaken for stones. I have drunk olive-oil by the tumblerful, but cannot say that I ever experienced any benefit from it. The taste, after all, is not so disagreeable, and I dare say it might be improved by the addition of menthol or other substance. Patients enduring the agony of biliary colic do not, however, trouble much about taste. The eructations that follow

olive-oil when taken in large quantity are, however, by no means pleasant. Various substitutes have been proposed: among others, eunatrol, in the form of pills, a combination of olive-oil and soda. So many pills would require to be swallowed in order to procure the effect of as much olive-oil as is generally thought to be required, that it can scarce be regarded as an improvement on the original remedy. Almond-oil, purified petroleum-oil, and other substances, act also as solvents, though to a somewhat less degree than olive-oil, and when anyone objects to olive-oil, they are at least worthy of a fair trial. Though I have never gained any personal advantage from olive-oil, nor known any whom I could honestly regard as really benefited, it must be admitted there are various considerations that might suggest its use. (*a*) Rosenberg found by experiment that olive-oil taken in large quantity increased the flow of bile. This he attributed to the demand from the oil and fatty material in the duodenum for a larger quantity of bile to emulsify it. (*b*) Jankau found in experimenting on a dog that the quantity of fats and soaps in the bile increased from 1·47 per cent. when the animal was fed on meat, to 4·89 per cent. when fed on fat and bread, and to 6 per cent. when fed on olive-oil. There can be no question that fatty and soapy materials act as solvents on gall-stones. Brockbank, for example, found that a mixed cholesterin stone lost 63 per cent. of its weight in two days. Provided that it could be satisfactorily demonstrated that fatty and soapy materials when excreted with the bile act as solvents of stones in gall-bladder and ducts, and that enough could be excreted for that purpose, olive-oil would deservedly occupy a high place in therapeutics. (*c*) It will be remembered that the outlet of the common duct is extremely narrow, and that a stone which has found its way through the rest of the ducts frequently gets fixed at this point and ulcerates into the

duodenum. One can readily understand how oil and soapy materials passing into the duodenum would come in contact with a stone, and if there be any reason to conclude that a stone is fixed in this position, there is good reason for administering large doses of olive-oil. (*d*) At the International Congress of Medicine in 1900 Dr. Paul Cohnheim gave the result of some investigations which have a rather direct bearing on this point. He found that cases of dilatation of stomach, dependent not on an organic obstacle, but on spasm of the pylorus following an ulcer or fissure, or on a cicatrix at the outlet of the stomach, were markedly improved by large doses of olive-oil; that stenosis of the pylorus and duodenum characterized by continuous secretion and pyloric spasm after the principal meals were improved or completely cured; and that in ulceration, the oil acted as a narcotic. Such results given by the German school, who are thorough adepts in the use of the stomach-tube, and in determining the length of time food lies in the stomach, are strongly suggestive of the fact that olive-oil may be useful in relieving spasm of the bile-ducts and allowing a stone to pass more readily and with less pain.

In a word, there is much to be said in favour of olive-oil, provided it is not regarded as a specific and used only in suitable cases. It will have been seen from these pages that, apart from operation, there are three methods of dealing with stones—dissolving them, expelling them, or allowing them to rest. The popular idea that the virtue of mineral waters and other substances consists in expelling stones that are lying quietly in the gall-bladder is opposed to all we know of the pathology of the disease. If we know that they are already lying in the ducts everything is of value that will provide a quick, and, as far as possible, painless passage. Nor can any objection possibly be raised to the use of anything that will cause the solution of stones. The difficulty

rather lies in the fact that as yet there is no satisfactory clinical evidence that any drug has yet been discovered that so changes or adds to the material excreted from the liver that it can dissolve stones in gall-bladder or bile-ducts.

Throughout these pages we have insisted that the mischief lies not so much in the stones as in the migration of stones and inflammatory complications with which they are associated. This we have attributed to the development of microbes and to the lodgment in the gall-bladder and passage through the ducts of unhealthy and irritating bile. While the character of the bile forms a constant source of irritation, inflaming the biliary passages and setting in motion stones that may do endless mischief before they reach the duodenum, we have insisted that it is the main point of therapeutics to promote the flow and improve the character of the bile. Granted that this is accomplished, there can be no objection to giving olive-oil or other solvent, provided that it does not disorder the digestion, deteriorate the character of the bile, and increase the evil it is given to prevent. As a matter of fact, when the pain is acute narcotics are given, but with the cessation of inflammation there is generally also the cessation of pain and of all those symptoms that draw our attention to the disease. For my own part, judging from the facets on the stones I have passed, I believe there are still others lying in my gall-bladder, but as they have not given me the slightest discomfort for years, though a believer in drugs, I have no great inclination to repeat my past experience of drinking tumblerfuls of olive-oil. As we have said, however, when we have reason to believe that a stone is fixed at the outlet of the common duct, if other more urgent requirements permit, I know no objection to the use of olive-oil, and certainly not to a reasonable use of fatty food.

Mineral Waters.—The temples of Æsculapius were built

near mineral springs, and beside those healing waters the disciples of Æsculapius, and those suffering from all manner of disease, still in great numbers congregate. This is not the place to discuss whether the benefit derived from watering-places is due to the freedom from business and domestic anxieties, the pleasant society, the regular hours and generally picturesque surroundings, or from the waters themselves. Nor is this the place to discuss whether the virtue of these healing springs depends on the amount of water taken, its warmth, gas, or mineral constituents. To enter into any discussion as to how far these different elements beneficially affect those suffering from gall-stones, or the comparative value of different watering-places would of itself fill a volume. Carlsbad is the general favourite. There certainly is everything to be desired—genial surroundings, where the cares and worries of life can be left in the distance, and the steep hills with glorious views from their summits encourage such exercise as empties a loaded liver. It is only the few, however, who can afford the time and the expense necessary for a prolonged stay in this favourite spot.

There is no evidence, as is popularly supposed, that stones are got rid of in greater number at Carlsbad than elsewhere, but the pain is alleviated, and medical men there state that they have seldom recourse to the needle. Inflammation is subdued, and stones lie at rest, returning attacks bringing the wealthy back year after year to this favourite watering-place. Carlsbad water can of course be taken at home but not under the same conditions as on the spot. For home consumption I prefer the Contrexéville to the Carlsbad water. Though Contrexéville may not have all the advantages of Carlsbad, and the season is short, it has certainly for some time past gained a great, and, I think, deserved reputation in the treatment of biliary calculi. Not having had an opportunity of visiting it myself, I can only repeat

what has been told me by others, and express my indebtedness to the great courtesy of Dr. Debout-D'Estrées, who has answered my questions and sent me all the available literature on the subject. I can find nothing definitely to explain the beneficial action which these waters undoubtedly possess. They contain a large percentage of lime, with the addition of magnesia, soda, lithia, and iron, and we are aware that it has been said, on what ground I know not, that alkalies are useful in the treatment of gall-stones because they 'antagonize the development of acid tendencies and aid in the solution of mucus' (Hare). Another explanation that has been given is, that lime being an astringent, has a soothing effect on the lining membrane of the biliary passages, relieves the spasm and allows the stones to pass. This is also a good hypothesis, but there is nothing to substantiate it. I drink the water regularly, and, were the question asked why I do so, I can only reply that I have not the least idea; but that when on two or three occasions I have left it off, there have been some slight threatenings of a return of the old disease.

Surgery.—We have thus briefly discussed the medical treatment of gall-stones, and as it includes various hygienic measures and the adaptation to each individual case of numerous drugs in the Pharmacopœia, and though no infallible remedy suitable to all cases has yet been discovered—nor ever will be—yet I am fully convinced that were an early diagnosis made, and the treatment above recommended adopted, there would very seldom indeed be any question as to handing over the patient to the surgeon. At the same time, I heartily admire the brilliant efforts of the surgeon to cope with this disease in its worst forms, and, without entering into any description of the different forms of operation, we shall now briefly discuss the kind of case in which we think the question of operation ought to be carefully considered.

And here, at the outset, we are at once met with the fact that in deciding this question, there is generally a marked difference of opinion between the medical man in ordinary practice and the surgeon. The difference is easily explained. Gall-stone surgeons, as a rule, see only those in whom the disease has far advanced, who have gone through terrible suffering, and whose lives are in imminent danger. Medical men, in some districts especially, see many who suffer from gall-stones. They are called at intervals of a few weeks or months to relieve the pain of biliary colic, and by-and-by the patient ceases to have these attacks. It is seldom the medical man in ordinary practice sees anyone whose life is in imminent danger; and though sometimes he has a patient who has broken down and is scarce fit for work, and whose life seems unbearable, still he thinks of others whom he has known who have similarly suffered, who are now in robust health, and for years past have had no symptom of the disease.

There is another reason why some medical men, at least, are coming to regard serious operation with but little favour, and I am glad to see that so distinguished a surgeon as Treves has been uttering a protest against the excessive zeal of some of his colleagues. The surgeon operates. The first anxiety is over. The patient recovers and the wound is healed. He is discharged as cured. The surgeon knows nothing of his condition months or years afterwards, but the medical man who is called on to treat him for perhaps some other complaint, has been accustomed to hear: 'I have never been quite the same since that operation.' Further, now that chloroform and antiseptics have given comparative immunity from fatal consequences in operations formerly reckoned serious, there seems to be a tendency to rest satisfied with removing some excrescence or palpable manifestation of the disease without inquiring

too minutely into its cause. The system is diseased, and the surgeon removes something which shows itself as a palpable manifestation of the diseased system. How many children have been operated on during the past years for some mere fluffiness at the pharynx, which has been dignified by the name of adenoids, and which has caused little or no obstruction, when what was required was really fresh air and some respiratory exercise?

Before considering what particular forms of disease might be regarded as a legitimate field for operation, we must refer to some other questions that must be taken into consideration by the medical man before he hands over his patient to the surgeon. The general health of the patient must be considered, his social position, and, last but not least, who is to operate. It is quite evident, *e.g.*, that anyone suffering from serious lung or kidney disease, severe gout or diabetes, is not a fit subject for operation. Even surgeons themselves are chary of operating when there has been prolonged or deep jaundice. Further, the social position of the patient must be considered. It is sad to reflect, but we must take the facts as we find them, that there are many who cannot afford the time nor incur the expense of prolonged treatment, and who might be justified in incurring greater risk when there is a possibility of speedier cure. A wealthy man can afford to absent himself from business and go time after time, for weeks or months, to Carlsbad or elsewhere, but the poorly-paid labourer or the mother of a large family may see no alternative between a speedy cure by operation and the workhouse. In such cases it is difficult to advise.

There is the further question: Who is to operate? To open and drain a distended gall-bladder, to remove some, if not all, of the stones, is an operation so simple that it might readily be undertaken by anyone with a very limited

knowledge of surgery. The condition may seem simple enough, and yet when the surgeon cuts down he may find a mass of adhesions, a gall-bladder shrunk and shrivelled up below the liver, and not easily found, or he may find it necessary to establish a communication between the gall-bladder and intestine. This is not the kind of operation that ought to be undertaken by the average medical man, nor even, I hold, by the average surgeon. I have seen patients operated on by eminent surgeons, who had not made a speciality of gall-bladder surgery, and regret to say I would have had hesitation in committing a patient to their care. Far be it from me to say that there are not many general surgeons who would efficiently perform the most intricate operation in gall-bladder surgery. For my own part, however, I would prefer to submit myself to someone with large experience, who had devoted himself specially to the work, and who was in a position to cope with any unforeseen difficulty or emergency that might arise in the course of operation.

For these and other reasons it is not possible to draw any hard and fast line between those forms of this disease that might be regarded as affording or not affording an indication for operation. In order to arrive at a common understanding, it is necessary, however, that some such distinction should be made, and we shall therefore conclude by giving the opinion of several representative members of the profession as to the form of disease in which operation seems advisable.

1. Winiwarter regards the diagnosis of gall-stones as a sufficient indication for operation.

2. Gumprecht: Biliary colic or other severe symptoms which resist all treatment by hygiene, baths or medicine, which frequently recur and steadily wear out the sufferer; obstruction of bile-ducts lasting for months; threatening

cholæmia or pyæmia; fistulæ without sufficient exit; adhesions causing serious trouble; rupture of the gall-bladder with threatened peritonitis (*Neuere Fortschritte in der Kenntniss der Cholelithiasis*).

3. Kehr recommends that the following are best treated medically or by residence in Carlsbad. (1) Acute obstruction of the common duct so long as it takes its normal or favourable course (should the mischief be prolonged, and fever and rapid pulse point to inflammatory affection of the bile-ducts, the question of operation must be considered). (2) Inflammatory processes in the gall-bladder, when they seldom or at least not too frequently recur. (3) Frequent biliary colic, followed by the passage of stones. Should the attacks be very frequent and no stones passed, operation is indicated. (4) Those who suffer from obesity, dropsy, diabetes, or in whom affections of the heart, lungs, kidneys or liver might make the administration of anæsthetics or narcotics dangerous. (5) Those who have already been operated on.

Operation he regards as always advisable in the following conditions: (1) Acute sero-purulent cholecystitis or peri-cholecystitis. (2) Adhesions between gall-bladder and intestines, stomach or omentum, provided they cause serious trouble. (3) Chronic obstruction of the common duct. (4) Chronic obstruction of the cystic duct (dropsy, empyæma of the gall-bladder). (5) All those manifestations of cholelithiasis that begin in a mild form, but which in their further course resist all treatment in watering-places or by medicine, and through constantly recurring pain and other symptoms deprive the patient of all comfort in life and render the pursuit of his occupation impossible. (6) Purulent affections of the ducts and abcess of the liver. (7) Perforation through the biliary passages and peritonitis. (8) The gall-stone morphia habit.

4. Carl Beck advises operation in the following conditions: (1) When the diagnosis of acute cholecystitis is made, cholecystotomy should be performed without delay. (2) In chronic dropsy. (3) Whenever acute colicky attacks in the region of the gall-bladder return for a second or third time. (4) Jaundice persisting more than four weeks. (5) In all obscure cases, when inflammatory symptoms in the region of the gall-bladder resembling peritonitis turn up, laparotomy is indicated.

5. To the indications for operation given by Mayo Robson we shall append a few remarks reiterating the substance of what has been already said. 'The indications for operating would seem to be as follows: (*a*) In frequently recurring biliary colic without jaundice, with or without enlargement of the gall-bladder.' This is but little removed from Winiwarter's famous dictum—that the diagnosis of gall-stones is sufficient indication for operation. Everyone knows that the vast majority of such patients ultimately recover, and it ought not to be forgotten that the mere removal of gall-stones affords no guarantee against their recurrence. Why then operate? It may be said because it affords a speedier means of cure. Apart from the danger to life, which, even with the most advanced and skilled surgery, cannot be entirely put out of the question, the cure is not always immediate and is by no means always permanent. We have admitted, however, that in certain circumstances a speedy cure is extremely to be desired, and the question whether in order to obtain it operation is advisable may be a practical one. Surely, however, the urgency is never so great but that other means may first be tried.

Further, it has been said that, as in course of time complications may possibly arise which render operation difficult, it were better always to resort to it in the

earliest stages. If this position be accepted, there would be no limit to operation. Are we to operate for appendicitis when pain is first felt in the right iliac region, or remove Peyer's patches because there is a possibility of perforation?

When, however, frequently recurring pain has brought the patient entirely under the power of morphia, I grant that the advisability of operation ought to be seriously considered.

'(*b*) In enlargement of the gall-bladder without jaundice, even if unaccompanied by great pain.' The surgeon, who has made up his mind to operate in such cases, ought not to delay, otherwise he will find in the great majority that the enlargement has disappeared. To avoid misapprehension, it ought, however, to be distinctly stated that the mere disappearance of a distended or dropsical gall-bladder does not always imply that the stone which has been blocking the cystic duct has passed into the duodenum. When a stone enters and occludes a cystic duct, there may be rapid effusion into the gall-bladder, which gradually disappears, just as a synovitic effusion from the knee-joint. The effusion may disappear and yet the stone remains at the entrance of the cystic duct, and an attack of biliary colic may soon follow.

As already said, dropsy of the gall-bladder is frequently found, even where there are no stones occluding the cystic duct, and in such cases, Kehr's main reason for operation is the risk of reinfection. Under judicious treatment I do not think there is any great risk of reinfection, and in any case some stronger reason is required for operation than the mere 'enlargement of the gall-bladder without jaundice and unaccompanied by great pain.'

'(*c*) In persistent jaundice, ushered in by pain, and where recurring pains with or without ague-like paroxysms render

it probable that the cause is gall-stones in the common duct.' This, doubtless, is a condition where the question of operation ought to be seriously considered, and it is one by no means easy to decide. In looking over the records of cases, we find that there have been a few individuals who have had pronounced jaundice for years and yet been restored to normal health. This, however, is exceptional, and a time will come when, after the complete blockage of the common duct by a stone, life is in serious danger. Of course it is always possible that the stone may pass directly through the ducts, or perforate and pass quite safely into the intestines. The question is—Is the risk incurred by waiting for this event greater or less than that incurred by operation? Till recently the mortality from the different forms of operation to relieve this condition could scarce be regarded as under 25 per cent. Kehr claims by improved methods of operation to have obtained within the last year or two far more favourable results. In the first sixty-two patients on which he performed choledochotomy there was a mortality of 10 per cent., in the last forty-two that mortality was reduced to 4·5 per cent. (*Münchener Medicinische Wochenschrift*, April 4, 1901). Provided this later mortality represented the work of the gall-bladder surgeon, I do not think medical men should raise any strong objection to operation when there are urgent symptoms denoting danger to life and a stone has for a few weeks—in earlier modes of operation we would have said months or even years—been completely obstructing the common duct.

'(*d*) In empyæma of the gall-bladder.' As we have already said, if the ducts are open, there is more likelihood of cure by constant irrigation with healthy bile than by emptying the gall-bladder, washing out with sterilized water or an antiseptic, and providing for drainage. No man can say

with absolute certainty that there is pus in the gall-bladder till he has cut into it, but it is well known that recovery without operation is quite a common occurrence when all the symptoms point in that direction. If careful observation be made, I think it will be found that these cases are far more common than is generally supposed, and that they not infrequently disappear independent of treatment. As I write these lines, the *British Medical Journal* of June 15, 1901, comes to hand, in which are reported five cases of cholecystitis following typhoid fever. Three were operated on, two of which contained pus and the third blood-clots, lymph, stones and typhoid bacilli. In one of these cases operation was fatal. In the two not operated on the cholecystitis spontaneously disappeared.

'(*e*) In peritonitis starting in the right hypochondrium.' The mere fact that there is peritonitis commencing in the right hypochondrium certainly does not of itself justify operation. It is almost impossible to believe that Mayo Robson or any surgeon would proceed to operate without assigning some stronger reason than this, or that any medical man would consent to it.

'(*f*) In abscess around the gall-bladder or bile-ducts, whether in the liver, or under or over it.' If the abscess be small, it will probably never be diagnosed. If of any considerable size, the other lesions associated with it will determine the propriety of operation.

'(*g*) In some cases where, although gall-stones may have passed, adhesions remain and prove a source of pain and illness.' This we regard as a legitimate field for operation, in which, however, the surgeon cannot always succeed.

'(*h*) In fistulæ, mucous, muco-purulent or biliary.' External fistulæ are rare, but the patient may be benefited by operation.

'(*i*) In certain cases of chronic jaundice, with distended gall-bladder dependent on some obstruction in the common duct, although the suspicion of malignancy be entertained.' If the patient is *in extremis* and no hope of recovery can be held out apart from operation, and a surgeon is found willing to undertake it, I know no reason why the medical man should object.

'(*j*) In phlegmonous cholecystitis and gangrene, if the case be seen and recognised at a sufficiently early stage of the disease.'

'(*k*) In gunshot injury or in stab-wounds over the region of the gall-bladder.'

'(*l*) In suspected rupture of the gall-bladder.'

'(*m*) In some cases of chronic catarrh of the gall-bladder or bile-ducts.' Apart from gall-stones, there are many causes of catarrh of the gall-bladder and bile-ducts, and if the medical man is at pains to find out and remove the cause of the disease, it is exceedingly improbable that in the course of a lifetime he will ever hand over a case to the surgeon. If the cause is persistent, the surgeon may, at the risk of life, give some measure of relief, but he will not effect a permanent cure.

'(*n*) In infective and suppurative cholangitis.' If pus be found in any quantity in the intra-hepatic ducts, unless the extra-hepatic ducts are completely blocked, it is somewhat difficult to understand what advantage could be gained by operation. A supply of pure bile, if it could be obtained, would certainly act better in clearing the ducts.

To sum up in a word:

1. The importance of diagnosis and treatment in the earliest stages of gall-stones cannot be too fully realized, as complications may afterwards arise that will defy all treatment by physician or surgeon.

2. We are further convinced that the records of gall-

bladder surgery during the past ten years have clearly shown that the results anticipated have not been realized, and that, unless in the most exceptional cases, the gall-bladder sufferer will derive more real and lasting benefit from hygienic and medical treatment than from operation.

THE END

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